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ANNALS

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EDWARD C. PICKERING, DIRECTOR

VOLUME 78, PART 1

VARIABLE STARS

IN THE

CLUSTER MESSIER 3

BY

SOLON I. BAILEY

PHILLIPS PROFESSOR OF ASTRONOMY

PRINTED FROM FUNDS RESULTING FROM THE WILL OF

JOSIAH QUINCY, JUN.

WHO DIED IN APRIL, 1775, LEAVING A NAME INSEPARABLY CONNECTED WITH THE HISTORY OF THE AMERICAN REVOLUTION

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PREFACE

THE present volume contains the second portion of the study of variable stars in clusters undertaken by Professor Bailey. The first portion of this work is contained in Volume 38 of these Annals. A detailed discussion is there given of 128 variables contained in the cluster ω Centauri. As this affords a means of studying the errors of the original measurements, it has not been thought necessary to give the observations in detail from which the results contained in the present work are derived.

All of the measurements have been made by Professor Bailey and Miss E. F. Leland.

EDWARD C. PICKERING,
Director of the Observatory of Harvard College

CAMBRIDGE, U.S., *May 16, 1913*

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VARIABLE STARS IN THE CLUSTER MESSIER 3

CHAPTER I

SEQUENCE OF COMPARISON STARS

An examination of twenty-three clusters was made by the writer at Arequipa during the years 1895 to 1897, which led to the discovery of about five hundred new variable stars. The results of this examination are given in H.A. 38, page 2. The publication of the discussion of the variables in Messier 3 has been delayed for several years in order to obtain absolute photographic magnitudes. The adoption of standard photographic magnitudes for the North Polar Sequence now permits the conclusion of the original investigation. Later, it is hoped, the discussion will be brought forward to the present time.

Messier 3, N. G. C. 5272, is in some respects the most remarkable globular cluster which has been investigated. It is a highly condensed, nearly symmetrical, cluster. From a count of the brighter stars made on X 6792, out of 1,213 stars in all, 590 were in the northern half, and 623, in the southern half of the cluster; 621 stars were in the preceding half, and 592, in the following half. The visual magnitude of the cluster, regarded as a single object, is about 6.0. Its approximate position for 1900.0 is $13^h\ 37^m.6$, $+28°\ 53'$. Photographs made at Arequipa with the 13-inch Boyden Refractor, having an exposure of 2 hours, show from 1,200 to 1,500 stars; photographs made on Mount Hamilton by the late Professor Keeler with the 36-inch Crossley Reflector, having an exposure of 1 hour, show about 4,000 stars; and a photograph made on Mount Wilson by Mr. Ritchey with the 60-inch Reflector, having an exposure of 4 hours, shows not less than 30,000 stars. These quantities include, in all cases, the estimated number of stars in the central portion, where, owing to the great density of the cluster, the region is so burned out on the plate that the individual stars cannot be distinguished. The extent of this area varies with the instrument employed and the length of the exposure.

A description of the methods used in the discovery and study of cluster variables was given in H.A. 38, Chapter I. In the Appendix of the same volume standard

stars are given suitable for the determination of the positions of the comparison stars and variables. These stars have also served in part as standards of magnitude. Five such stars, designated A, B, C, D, and E, are given in Table XXIV, page 238, of H.A. 38. The coordinates of these stars, as well as those of the comparison stars used in the measurement of the brightness of the variables, and those of the variables themselves, are given in the same table. Three of the standard stars, A, C, and D are found in the Bonn Durchmusterung. Their identifications and positions are given in Table XXV, page 245, of the same volume. Four additional standard stars were selected, which were designated by the letters F, G, H, and K. Their coordinates in X are, respectively, $+671''.4$, $+425''.5$, $+395''.6$, and $+314''.0$; and in Y, $-349''.7$, $-405''.4$, $-215''.2$, and $-163''.6$. The photometric magnitudes of all these stars, A to K, with the exception of E and K, were determined by the Director of the Harvard Observatory with the 12-inch Meridian Photometer. The star K, and the comparison stars, a to p, were either too faint or too near the centre for measurement with the 12-inch Photometer. Through the kind assistance of Mr. J. A. Parkhurst, of the Yerkes Observatory, the magnitudes of several stars of the sequence, extending the photometric scale to the sixteenth magnitude, were determined with the 40-inch Refractor, using the stars A to H as standards. All of the above determinations of magnitude are given below, in Table I. It seems probable that the scale of the Harvard Photometry has thus been extended to these faint stars without serious errors. For the precise determination of the magnitudes of the comparison stars, the following methods were employed: —

The magnitudes of the standard and comparison stars were measured in June, 1908, by Miss E. F. Leland, on six plates, X 6844, X 8563, X 9204, K 3, K 4, and K 10. The X plates were made at Arequipa with the 13-inch Boyden Refractor. The K plates were made on Mount Hamilton by the late Professor Keeler with the 36-inch Crossley Reflector. The dates on which these plates were taken and the exposures employed will be found in Table VIII, page 12. The images of the stars on the X plates were compared with those of Scale P, cut from C 15350, and the images on the K plates, with those of Scale M, cut from I 32811. The results of these measurements are given in Table I, in which the first column gives the designation of the star, capital letters being employed to indicate the standard stars, and small letters to denote the stars of the sequence selected for the determination of the magnitudes of the variables. The second column contains the photometric magnitudes of the stars, so far as they had been determined. As explained above, the magnitudes of the stars A to H were determined with the 12-inch Meridian

Photometer at the Harvard Observatory, and those of the stars a to g, l and m, with a Rumford Photometer attached to the 40-inch Refractor of the Yerkes Observatory. The third to the eighth columns contain the scale readings of the stars on the six plates, arranged in the order, X 6844, K 3, K 4, X 8563, X 9204, and K 10. The quantities in each of these columns were then plotted as ordinates, with the corresponding magnitudes given in the second column as abscissas, and smooth curves were drawn through the points thus obtained. The curves thus drawn serve to reduce the scale readings of the stars to the equivalent photometric magnitudes, which are given in the ninth to the fourteenth columns. The fifteenth column gives the mean magnitudes derived from the preceding six columns, and the sixteenth column contains the corresponding residuals. To reduce these photometric magnitudes to photographic magnitudes, a constant correction of +0.45 magn. has been applied to the values given in the fifteenth column, and the resulting magni-

TABLE I

MAGNITUDES OF COMPARISON STARS. I

Des.	Photom. Magn.	Scale Readings						Magnitudes						Mean Magn.	Residuals	Photog. Magn.
		X 6844	K 3	K 4	X 8563	X 9204	K 10	X 6844	K 3	K 4	X 8563	K 9204	K 10			
A	8.49	1.0	B	B	1.2	B	B	8.20	..	..	8.00	..	..	8.10	10,..,..,*10*,..,..	8.55
C	10.25	2.7	2.6	2.4	3.1	3.0	2.5	10.02	10.20	10.12	10.05	10.28	10.30	10.16	*14*, 4, *4*,*11*,12,14	10.61
D	9.83	2.9	2.7	2.6	3.3	3.0	2.6	10.50	10.52	10.47	10.55	10.28	10.62	10.49	1, 3, *2*, 6,*21*,13	10.94
B	11.67	3.6	3.2	3.3	3.7	3.5	3.1	11.45	11.50	11.38	11.40	11.33	11.38	11.41	4, 9, *3*, *1*, *8*, *3*	11.86
F	12.04	4.4	4.0	4.2	4.4	4.3	3.9	12.17	12.20	12.16	12.18	12.18	12.08	12.16	1, 4, 0, 2, 2, *8*	12.61
G	12.73	4.7	4.1	4.4	4.6	4.6	4.1	12.42	12.27	12.30	12.37	12.43	12.24	12.34	8, *7*, *4*, 3, 9,*10*	12.79
H	13.01	5.8	6.1	6.3	5.5	5.5	5.7	13.13	13.52	13.52	13.05	13.04	13.14	13.23	*10*,29,29,*18*,*19*, *9*	13.68
K	..	6.4	6.5	6.7	5.9	5.9	6.3	13.52	13.88	13.82	13.35	13.33	13.64	13.59	*7*,29,23,*24*,*26*, 5	14.04
a	13.45	6.0	5.3	5.5	5.5	5.4	5.4	13.27	12.97	13.02	13.04	13.00	12.95	13.04	23, *7*, *2*, 0, *4*, *9*	13.49
b	12.90	6.1	5.5	5.5	5.5	5.3	5.6	13.39	13.11	13.02	13.04	12.94	13.08	13.10	29, 1, *8*, *6*,*16*, 2	13.55
c	13.46	6.5	6.1	6.2	6.0	6.1	6.1	13.60	13.52	13.46	13.40	13.47	13.45	13.48	12, 4, *2*, *8*, *1*, *3*	13.93
d	13.55	6.7	6.2	6.5	6.3	6.3	6.3	13.75	13.60	13.66	13.65	13.63	13.65	13.66	9, *6*, 0, *1*, *3*, *1*	14.11
e	14.15	7.1	6.7	7.0	6.5	6.7	6.7	14.21	14.13	14.15	13.89	14.09	14.09	14.09	12, 4, 6,*20*, 0, 0	14.54
f	14.62	7.5	7.2	7.3	6.9	7.1	7.0	14.79	14.71	14.55	14.35	14.64	14.50	14.59	20,12, *4*,*24*, 5, *9*	15.04
g	14.72	7.7	7.3	7.5	7.2	7.3	7.2	14.83	14.83	14.81	14.76	14.90	14.77	14.82	1, 1, *1*, *6*, 8, *5*	15.27
h	..	8.0	7.7	7.7	7.5	7.5	7.5	15.18	15.32	15.05	15.14	15.15	15.16	15.17	1,15,*12*, *3*, *2*, *1*	15.62
k	..	8.2	7.9	8.0	7.8	7.7	7.6	15.43	15.56	15.44	15.53	15.45	15.30	15.45	*2*,11, *1*, 8, 0,*15*	15.90
l	15.77	8.5	8.1	8.2	8.0	7.9	7.9	15.78	15.80	15.69	15.81	15.69	15.70	15.74	4, 6, *5*, 7, *5*, *4*	16.19
m	16.08	8.7	8.3	8.5	8.2	8.2	8.2	16.02	16.02	16.08	16.07	16.10	16.10	16.06	*4*, *4*, *2*, 1, 4, 4	16.51
n	..	8.9	8.5	8.9	8.5	8.6	8.5	16.27	16.27	16.60	16.46	16.63	16.52	16.46	*19*,*19*,14, 0,17, 6	16.91
o	..	9.2	8.8	9.5	8.9	8.9	8.7	16.63	16.63	17.35	16.98	17.06	16.78	16.90	*27*,*27*,45, 8,16,*12*	17.35
p	..	9.7	9.5	9.7	9.3	9.5	9.3	17.23	17.49	17.63	17.48	17.70	17.55	17.51	*28*, *2*,12, *3*,19, 4	17.96

tudes are given in the last column. The reasons for applying this correction are stated below in connection with Table II.

The photographic magnitudes of a sequence of stars near the North Pole have been determined at the Harvard Observatory with great care, as described in H.C. 170. The scale of magnitudes of this primary sequence can be transferred to other parts of the sky by means of duplicate exposures, of the same duration and at equal altitudes, on the same plate. One exposure is on the North Pole, and the other, on any desired region. Plates MC 455 and 460, made at Cambridge with the 16-inch Metcalf Telescope on July 4 and 5, 1910, are of this description. Each plate had an exposure of precisely 30^m on the North Pole, and also an equal exposure on Messier 3, when the cluster was at the altitude of the Pole. The Standard North Polar Sequence and the stars near Messier 3 whose magnitudes are desired are thus found on the same plate for purposes of comparison. In this case, therefore, no scale was used by Miss Leland, but direct estimates of the absolute photographic magnitudes were made. The results of these measurements are given in Table II. The first column gives the designation of the star. Stars fainter than e were not sufficiently well shown for measurement. The second column gives the photographic magnitudes as derived from MC 455, and the third column, those derived from MC 460. The fourth column contains the means expressed to hundredths, and the fifth column, the corresponding residuals expressed in tenths of a magnitude. The sixth column contains the photometric magnitudes of the stars, repeated from Table I. The seventh column gives the differences obtained by subtracting the photometric from the photographic magnitudes. This difference is always positive, and its mean value for the stars in question is +0.45 magn.

TABLE II

MAGNITUDES OF COMPARISON STARS. II

Des.	MC 455	MC 460	Mean Magn.	Res.	Photom. Magn.	Diff.	Des.	MC 455	MC 460	Mean Magn.	Res.	Photom. Magn.	Diff.
A	..	..	..	..	8.49	..	K	14.3	14.3	14.30	0,0	..	..
C	10.5	10.5	10.50	0,0	10.25	+.25	a	13.7	13.8	13.75	1,0	13.45	+.30
D	10.5	10.6	10.55	1,0	9.83	+.72	b	13.2	13.6	13.40	2,2	12.90	+.50
B	11.8	12.0	11.90	1,1	11.67	+.23	c	14.1	14.3	14.20	1,1	13.46	+.74
F	12.5	12.5	12.50	0,0	12.04	+.46	d	14.1	14.5	14.30	2,2	13.55	+.75
G	12.9	12.9	12.90	0,0	12.73	+.17	e	14.4	..	14.40	..	14.15	+.25
H	13.5	13.7	13.60	1,1	13.01	+.59							

It was, therefore, assumed that to correct the magnitudes of the fifth column of Table I, which are on the photometric scale, to the photographic scale, a correction of +0.45 magn. must be applied. This result for the stars of Messier 3 is confirmed by a consideration of the class of spectrum of the cluster. From photographs obtained with the 60-inch Reflector on Mount Wilson, Dr. E. A. Fath found the spectrum to be of Class F. In H.A. 59, No. 6, Mr. E. S. King has given a table of corrections that may be used to convert photometric into photographic magnitudes, according to the class of spectrum. The two scales of magnitudes are made to coincide for Class A. The correction for Class F is +0.30, and for Class G is +0.72. The correction for F 5 is +0.42. Though the photographs do not permit a precise classification, this result appears to be in harmony with the correction applied in Table I.

TABLE III

MAGNITUDES OF COMPARISON STARS. III

Des.	MC 447	MC 443	MC 447	Corrected			Means	Residuals	Magnitudes
				MC 447	MC 443	MC 447			
A	1.1	1.8	0.9	0.0	0.0	0.0	0.00	., .. .	8.87
C	4.0	4.9	3.9	2.9	3.1	3.0	3.00	*1*, 1, 0	10.68
D	4.0	4.6	3.8	2.9	2.8	2.9	2.87	0, *1*, 0	10.48
B	5.2	6.2	5.1	4.1	4.4	4.2	4.23	*1*, *2*, 0	11.91
F	6.0	7.0	6.0	4.9	5.2	5.1	5.07	*2*, 1, 0	12.49
G	6.5	7.4	6.7	5.4	5.6	5.8	5.60	*2*, 0, *2*	12.90
H	7.4	8.2	7.3	6.3	6.4	6.4	6.37	*1*, 0, 0	13.56
K	8.1	8.7	8.1	7.0	6.9	7.2	7.03	0, *1*, *2*	14.17
a	7.5	8.2	7.5	6.4	6.4	6.6	6.47	*1*, *1*, 1	13.65
b	7.3	8.1	7.5	6.2	6.3	6.6	6.37	*2*, *1*, *2*	13.56
c	7.9	8.7	8.0	6.8	6.9	7.1	6.93	*1*, 0, *2*	14.06
d	8.1	8.9	8.1	7.0	7.1	7.2	7.10	*1*, 0, 1	14.23
e	8.3	9.2	8.5	7.2	7.4	7.6	7.40	*2*, 0, *2*	14.50
f	8.7	9.7	8.7	7.6	7.9	7.8	7.77	*2*, 1, 0	14.89
g	9.0	9.9	8.9	7.9	8.1	8.0	8.00	*1*, 1, 0	15.14
h	9.7	..	9.5	8.6	..	8.6	8.60	0, ., 0	15.80
k	9.9	..	9.8	8.8	..	8.9	8.85	0, ., 1	16.04
l	10.0	..	9.9	8.9	..	9.0	8.95	*1*, ., 0	16.16

The standard and comparison stars were also measured on two MC plates of 60^m exposure, which show fainter stars than the plates of duplicate exposure discussed in Table II. These plates had no exposure on the Pole and were measured with scale M. The results of these measurements are given in Table III. The first column gives the designation of the stars. The second column contains the

scale readings on MC 447, and the third column, the corresponding values on MC 443. Plate MC 443 was made on June 28, 1910, and MC 447, on June 29, 1910. The fourth column contains a second determination of the scale readings on MC 447. For convenience in taking the means, since the second series is incomplete, the quantities in the second, third, and fourth columns have been reduced by 1.1, 1.8, and 0.9, respectively, and the results are given in the fifth, sixth, and seventh columns. The means are given in the eighth column, and the corresponding residuals in the ninth column. These means were then plotted as ordinates, with the corresponding photographic magnitudes given in Table II as abscissas, and a smooth

TABLE IV

MAGNITUDES OF COMPARISON STARS. IV

Des.	A 8358	A 8327	A 8358	A 8327	Means	Residuals	Photog. Magn.	Photog. Magn.
1	1.6	1.7	1.6	1.7	1.65	*1*, 0, *1*, 0	7.77	8.20
2	2.6	2.7	2.7	2.8	2.70	*1*, 0, 0, 1	9.26	9.40
3	3.0	2.9	2.9	2.9	2.93	1, 0, 0, 0	9.88	9.68
4	3.0	3.2	3.0	3.0	3.05	*1*, *2*, *1*, *1*	10.19	9.78
5	2.8	2.9	2.9	2.9	2.88	*1*, 0, 0, 0	9.78	9.60
6	3.1	2.9	3.1	2.9	3.00	1, *1*, 1, *1*	10.14	9.73
7	3.0	3.3	3.3	3.2	3.20	*2*, 1, 1, 0	10.26	9.95
8	2.6	2.5	2.5	2.6	2.55	1, 0, 0, 1	8.87	9.24
9	3.4	3.5	3.4	3.3	3.40	0, 1, 0, *1*	10.17	10.18
10	3.5	3.5	3.7	3.7	3.60	*1*, *1*, 1, 1	10.47	10.40
α	3.9	4.0	4.0	4.1	4.00	*1*, 0, 0, 1	11.49	10.86
β	4.8	4.9	4.9	4.9	4.88	*1*, 0, 0, 0	12.16	11.85
γ	5.8	6.0	5.9	5.8	5.88	*1*, 1, 0, *1*	13.08	12.98
ϵ	6.4	6.4	6.4	6.5	6.42	0, 0, 0, 1	13.02	13.62
a	6.1	5.7	6.2	5.8	5.95	1, *3*, *2*, *2*	..	13.09
b	6.9	6.3	6.8	6.3	6.58	*3*, *3*, *2*, *3*	..	13.80
c	6.8	6.3	6.8	6.2	6.52	*3*, *2*, *3*, *3*	..	13.68
d	7.2	6.7	7.2	6.6	6.92	*3*. *2*, *3*, *3*	..	14.13
e	7.2	6.8	7.3	6.9	7.05	*2*, *2*, *3*, *1*	..	14.25
f	7.6	7.3	7.7	7.3	7.48	1, *2*, *2*, *2*	..	14.81
g	8.1	7.8	8.1	7.6	7.90	*2*, *1*, *2*, *3*	..	15.27
h	8.4	8.1	8.5	8.0	8.25	*2*, *1*, *3*, *2*	..	15.60
k	8.9	8.5	9.0	8.3	8.68	*2*, *2*, *3*, *4*	..	16.17
l	..	8.7	..	8.6	*8.88*	., *2*, ., *3*	..	16.40
m	9.2	8.9	9.3	8.8	9.05	*2*, *1*, *3*, *2*	..	16.50
n	9.2	9.1	9.5	9.0	9.20	0, *1*, *3*, *2*	..	16.72
o	9.5	9.3	9.5	9.2	9.38	1, *1*, 1, *2*	..	16.96
p	10.0	9.5	9.9	9.5	9.72	*3*, *2*, *2*, *2*	..	17.30

curve was drawn through the points thus obtained. This curve, sufficiently extended to cover all the scale readings contained in Table III, was then read, and the results are given in the last column.

Two plates of Messier 3, having duplicate exposures, were made at Arequipa with the 24-inch Bruce Telescope. These plates were A 8327, made on May 31, 1907, and A 8358, made on June 28, 1907. Each plate had an exposure of 30^m on Messier 3, and an equal exposure on the secondary standard region at 17^h, $+15°$. In this region photographic magnitudes of 14 stars denoted by the numbers 1 to 10, and α, β, γ, ϵ, had been determined by the Director, by comparison with the Polar Sequence on plates of duplicate exposure. These stars and the standard and comparison stars of Messier 3 were measured on A 8327 and A 8358 by comparison with Scale P. The results are contained in Table IV, in which the first column gives the designation, and the second and third columns, the scale readings on X 8358 and X 8327, respectively. The fourth and fifth columns contain the results of remeasurements of the same plates. The means of the four measures are given in the sixth column, and the corresponding residuals, in the seventh column. The photographic magnitudes of the secondary standard stars at 17^h, $+15°$, are given in the eighth column. A smooth curve was drawn as in previous cases, and the resulting magnitudes are given in the ninth column.

TABLE V

MAGNITUDES OF COMPARISON STARS. V

Des.	L X 9204	L K 10	B K 8	B K 10	Means	Residuals	Sums	Magnitudes
a	1	1	.	.	1.0	0, 0, ., .	0.0	13.49
b	4	3	.	.	3.5	0, *1*, ., .	1.0	13.61
c	3	3	2	2	2.5	1, 1, 0, 0	4.5	14.03
d	5	4	4	2	3.8	1, 0, 0, *2*	7.0	14.33
e	4	3	3	3	3.2	1, 0, 0, 0	10.8	14.81
f	3	3	2	1	2.2	1, 1, 0, *1*	14.0	15.18
g	4	3	2	2	2.8	1, 0, *1*, *1*	16.2	15.44
h	1	2	1	0	1.0	0, 1, 0, *1*	19.0	15.79
k	2	2	3	2	2.2	0, 0, 1, 0	20.0	15.91
l	3	3	2	2	2.5	1, 1, 0, 0	22.2	16.17
m	5	3	2	1	2.8	2, 0, *1*, *2*	24.7	16.47
n	3	2	3	3	2.8	0, *1*, 0, 0	27.5	16.82
o	4	5	.	3	4.0	0, 1, ., *1*	30.3	17.14
p	.	.	.	.	..	..	34.3	17.63

The intervals in grades between the successive stars in the sequence for the variables in Messier 3 were estimated on X 9204 and K 10 by Miss Leland, and on K 8 and K 10 by the writer. The date, exposure, and quality of these plates can be found in Table VIII, page 12. The results of the estimates are given in Table V, where the first column contains the designation. The second and third columns give the estimated intervals in brightness between successive stars, by Miss Leland, denoted by L, and the fourth and fifth columns, the estimates by the writer, denoted by B. The estimated interval is placed in the same line as the brighter of the two stars compared. The sixth column contains the means, and the seventh column, the corresponding residuals. The sums are given in the eighth column, and the magnitudes obtained by plotting the sums as ordinates, and the means of the magnitudes taken from the preceding four tables as abscissas, are given in the ninth column. These results, therefore, serve simply to correct the intervals between the stars of the sequence.

A summary of the results obtained by these more or less independent methods, and the magnitudes adopted as final for the stars of the sequence, a to p, are given in Table VI. The first column contains the designation, and the second, third, fourth, fifth, and sixth columns, the magnitudes obtained in Tables I to V. The different determinations may be briefly summarized as follows:—I. Magnitudes derived from scale measures on X and K plates, reduced to the scale of the photometric magnitudes determined by the 12-inch and 40-inch photometers, and later reduced to photographic magnitudes by a constant correction. II. Absolute photographic magnitudes, obtained by direct comparison, on MC plates of duplicate exposure, with the Polar Sequence. III. Magnitudes derived from scale readings on MC plates, reduced to the scale of magnitudes of the Polar Sequence. IV. Photographic magnitudes derived from scale measures of secondary standard stars at 17^h, $+15°$, on A plates of duplicate exposure. The scale of magnitudes depends indirectly on that of the Polar sequence. V. Mean estimates of the steps of the sequence reduced to the scale of magnitudes of Tables I to IV. The simple means of these five determinations have been accepted as the final magnitudes of the stars of the sequence in Messier 3, and they are given in the seventh column. The corresponding residuals are given in the last column. The star b of the sequence is probably a variable of very small range. Owing to the large number of variables in the cluster, much care was necessary in the selection of a sequence of comparison stars, and, so far as known, no other star of the sequence shows any evidence of variability. The variability of b was not suspected at first, but the various photometric and photographic determinations of its magnitude show discordances

which indicate that its light is not constant. It was accordingly treated as a variable and measured on 25 plates. From these measures it appears that b has a range of variation of not more than two or three tenths of a magnitude. With the exception of a single comparison of No. 4, No. 95 was the only star whose light had been compared with that of b, since no other variable at maximum equals b in brightness. All comparisons involving b were rejected, and new measures were made, using comparison stars whose light was believed to be invariable.

TABLE VI

MAGNITUDES OF COMPARISON STARS. VI

Des.	I	II	III	IV	V	Final Magn.	Residuals
a	13.49	13.75	13.65	13.12	13.49	13.50	*1*, 25, 15, *38*, 1
b	13.55	13.40	13.56	13.80	13.61	13.58	*3*, *18*, *2*, 22, 3
c	13.93	14.20	14.06	13.68	14.03	13.98	*5*, 22, 8, *30*, 5
d	14.11	14.30	14.23	14.13	14.33	14.22	*11*, 8, 1, *9*, 11
e	14.54	14.40	14.50	14.25	14.81	14.50	4, *10*, 0, *25*, 31
f	15.04	..	14.89	14.81	15.18	14.98	6, .., *9*, *17*, 20
g	15.27	..	15.14	15.27	15.44	15.28	*1*, .., *14*, 1, 16
h	15.62	..	15.80	15.60	15.79	15.70	*8*, .., 10, *10*, 9
k	15.90	..	16.04	16.17	15.91	16.00	*10*, .., 4, 17, *9*
l	16.19	..	16.16	16.40	16.17	16.23	*4*, .., *7*, 17, *6*
m	16.51	..	..	16.50	16.47	16.49	*2*, .., .., 1, *2*
n	16.91	..	..	16.72	16.82	16.82	9, .., .., *10*, 0
o	17.35	..	..	16.96	17.14	17.15	20, .., .., *19*, *1*
p	17.96	..	..	17.30	17.63	17.63	33, .., .., *33*, 0

In Annales de l'Observatoire de Paris, Volume XXV, page F 1, M. H. von Zeipel has given a determination of the precise positions of 1,571 stars in Messier 3. The stars whose positions were thus determined from photographic plates lie in a circle whose radius is 40′, having the cluster at the centre. Von Zeipel measured the coordinates of these stars on three plates, but in his Catalogue he has given their positions in right ascension and declination for the epoch 1900.0. Table VII gives, for the standard and sequence stars of this cluster, as well as for the variables, the corresponding numbers in the Catalogue of von Zeipel. The first column contains the Harvard designation, indicated by H, and the second column, the corresponding number of the star in the Catalogue of von Zeipel, indicated by Z.

The positions of the Comparison stars, o and p, and of the variables 17 and 103 were not determined by von Zeipel, apparently owing to their faintness. Asterisks were used to designate the variables, but in the case of Nos. 3 and 75, they were omitted.

TABLE VII

IDENTIFICATION OF STANDARD, COMPARISON, AND VARIABLE STARS, IN THE CATALOGUE OF VON ZEIPEL

H	Z	H	Z	H	Z	H	Z	H	Z	H	Z	H	Z	H	Z
A	1343	p	..	20	1380	40	234	60	222	80	1400	100	1122	120	223
B	1437	1	765	21	1386	41	407	61	1321	81	1384	101	1048	121	561
C	1346	2	894	22	1320	42	445	62	1187	82	391	102	1090	122	608
D	206														
E	174	3	1073	23	374	43	1207	63	999	83	181	103	..	123	244
F	1446	4	559	24	328	44	1307	64	1234	84	1105	104	650	124	479
G	1402	5	1357	25	362	45	252	65	1250	85	1373	105	679	125	1317
H	1397														
K	1376	6	361	26	296	46	355	66	396	86	1422	106	541	126	700
a	740	7	775	27	379	47	366	67	351	87	1222	107	455	127	1198
b	238	8	437	28	656	48	1253	68	922	88	597	108	264	128	1231
c	640	9	226	29	486	49	1268	69	1164	89	948	109	416	129	560
d	263	10	1291	30	593	50	840	70	1003	90	1201	110	397	130	818
e	250	11	321	31	982	51	965	71	1298	91	713	111	409	131	459
f	218	12	776	32	867	52	451	72	1409	92	623	112	333	132	524
g	227	13	644	33	1126	53	759	73	1406	93	214	113	1328	133	503
h	258	14	537	34	1265	54	616	74	1181	94	173	114	873	134	669
k	609	15	411	35	384	55	278	75	1057	95	318	115	1410	135	636
l	1131	16	221	36	1308	56	338	76	710	96	305	116	170	136	643
m	1055	17	..	37	253	57	1292	77	404	97	353	117	1184	137	1072
n	1327	18	1202	38	279	58	425	78	1051	98	1259	118	1277	..	..
o	..	19	1388	39	249	59	378	79	1041	99	1330	119	1353	..	..

CHAPTER II

OBSERVATIONS OF THE VARIABLES

THE variables in Messier 3 were first measured on 50 plates, which were selected from all the available material for their superior quality, except that a few of inferior quality were included, when they occurred on especially desirable dates. The measures of the variables on these plates are given in Table IX. The magnitudes were also determined on 40 additional plates, but in general only when the variables were near maximum, and the results are given in Table X. These 90 plates belong to three series, designated by the letters A, K, and X. The A plates were made with the 24-inch Bruce Telescope at Arequipa, the K plates, with the 36-inch Crossley Reflector on Mount Hamilton, and the X plates, with the 13-inch Boyden Telescope at Arequipa. The K plates are especially valuable, not only on account of their high quality, but also on account of the shortness of the exposure, which permits an accurate determination of the light curve during the extremely rapid changes immediately preceding the maximum. Striking examples of this are shown in the case of Variable No. 6, page 16, No. 22, page 19, No. 72, page 27, and others. In order to show the faintest variables, when their light was at minimum, an exposure of about 100 minutes was required with the 13-inch Boyden Telescope, and an exposure of 30 minutes, or more, with the 24-inch Bruce Telescope; but an exposure of only 10 minutes was sufficient, with the 36-inch Crossley Reflector. The cluster, owing to its northern declination, was not well placed for observation at Arequipa. A description of all the plates is given in Table VIII, in which the first column contains the series and number of the plate, and the second column, the date on which it was made. The third column contains the Julian Day and thousandths, following Greenwich Mean Noon, of the middle of the exposure. The fourth column gives the length of the exposure, expressed in minutes. The fifth column gives the means of independent estimates, by the two observers, of the quality of the plate. This is expressed on a scale of 1 to 5, where 1 is worthless, 2 very poor, 3 fair, 4 good, and 5 perfect.

The measurements of brightness of the variables were made by Miss Leland and the writer. They were compared in all cases with the stars of the sequence, a to

p, given in Table VI, Chapter I. The image of the variable was compared, in general, with those of a brighter and a fainter star, and the intervals were estimated in grades. In some cases, when the image of the variable appeared to be precisely equal to that of one of the comparison stars, an additional measure was thus obtained. In other cases, only the comparison of equality was made. These estimates were reduced by assuming that the grade equals a tenth of a magnitude. This is approximately true, and in any case, since a determination of magnitude depends either upon an equality of images or else upon comparisons with a brighter and a fainter star, any error in this assumption will affect the result slightly, if at all. In Tables IX and X these estimates in grades have not been included, but only the resulting magnitudes.

TABLE VIII

DESCRIPTION OF PLATES

Plate	Date	J. D.	Ex.	Quality	Plate	Date	J. D.	Ex.	Quality
	y. m. d.	d.	m.			y. m. d.	d.	m.	
X 6792	95 6 27	3372.527	100	4	A 1780	96 5 14	3694.533	50	2.5
X 6820	" 7 2	3377.517	90	3.5	A 1783	" " "	" .655	60	2.5
X 6828	" " 3	3378.520	90	3	A 1830	" 6 10	3721.510	66	2.5
X 6837	" " 5	3380.551	75	3	A 1832	" " "	" .641	64	2.5
X 6844	" " 8	3383.513	100	4	A 1838	" " 13	3724.507	65	4
X 6854	" " 9	3384.514	90	3.5	A 1840	" " "	" .664	70	3
X 6872	" " 11	3386.535	107	3	X 7654	" 7 6	3747.564	121	3
X 6875	" " 14	3389.545	90	3	X 8444	97 4 21	4036.555	152	3.5
X 6876	" " 15	3390.524	110	3	X 8563	" 5 22	4067.540	115	4.5
X 6909	" " 20	3395.513	120	3	X 8584	" " 26	4071.577	125	4.5
X 6916	" " 22	3397.535	183	2.5	X 8597	" " 28	4073.585	128	4
X 6918	" " 23	3398.510	120	2.5	X 8605	" " 29	4074.589	115	3
X 6923	" " 24	3399.520	150	3.5	X 8611	" 6 1	4077.492	121	5
X 6925	" " 25	3400.521	120	3	X 8612	" " "	" .581	120	4
X 6980	" 8 6	3412.504	80	2.5	X 8618	" " 2	4078.492	120	4
X 6990	" " 7	3413.503	100	3	X 8619	" " "	" .579	120	3
A 1751	96 4 14	3664.674	75	3	X 8624	" " 3	4079.493	120	4
X 7482	" 5 11	3691.533	120	3	X 8625	" " "	" .579	121	4
X 7483	" " "	" .643	122	3	X 8631	" " 4	4080.486	120	3.5
X 7488	" " 12	3692.540	127	3	X 8632	" " "	" .570	123	3
X 7489	" " "	" .651	125	2.5	X 8650	" " 8	4084.540	105	4
A 1774	" " 13	3693.525	55	2.5	X 8655	" " 9	4085.487	90	3.5
A 1775	" " "	" .568	55	3	X 8656	" " "	" .561	92	3
A 1776	" " "	" .611	55	2.5	X 8779	" 8 3	4140.478	103	3
A 1777	" " "	" .654	55	2.5	X 9158	98 5 27	4437.550	120	4

see p. 11.

Plate	Date	J. D.	Ex.	Quality	Plate	Date	J. D.	Ex.	Quality
	y. m. d.	d.	m.			y. m. d.	d.	m.	
X 9166	98 5 28	4438.541	120	3	K 6	00 5 20	5160.822	10	4
X 9204	" 6 15	4456.502	70	4.5	K 7	" " "	" .830	10	3
X 9205	" " "	" .575	90	3.5	K 8	" " "	" .843	10	2.5
X 9558	99 6 1	4807.613	120	3.5	K 9	" " "	" .853	10	2
A 3672	" 7 3	4839.480	55	3.5	K 10	" " 21	5161.713	10	5
A 3673	" " "	" .521	55	3	K 11	" " "	" .722	10	4
A 3674	" " "	" .563	55	3	K 12	" " "	" .735	10	4.5
A 3675	" " "	" .604	55	3	K 13	" " "	" .744	10	4.5
A 3677	" " 4	4840.523	60	3.5	K 14	" " "	" .756	10	5
A 3678	" " 5	4841.472	40	3	K 15	" " "	" .764	10	5
A 3679	" " "	" .503	40	3	K 16	" " "	" .777	10	5
A 3680	" " "	" .537	41	3	K 17	" " "	" .786	10	4
A 3681	" " "	" .571	40	3	K 18	" " "	" .799	10	4
A 3682	" " "	" .603	40	3	K 19	" " "	" .808	10	4
A 3684	" " 6	4842.489	30	3	K 20	" " "	" .820	10	4
K 1	00 5 20	5160.741	60	5	K 21	" " "	" .828	10	4
K 2	" " "	" .779	10	5	K 22	" " "	" .840	10	5
K 3	" " "	" .788	10	5	K 23	" " "	" .850	10	4
K 4	" " "	" .800	10	4	K 24	" " "	" .864	10	4.5
K 5	" " "	" .809	10	4	K 25	" " "	" .873	10	4.5

Table IX contains the measures of the variables on the 50 selected plates referred to above. The Julian Date of the observation, taken from Table VIII, is given in the first column on each page and applies equally to the corresponding observations of all the variables given on the same page. For each variable three columns are used. The first column contains the magnitude. The magnitude has been expressed only to tenths when the variable was near the limit of visibility and hence the comparison was doubtful. Italics denote that the variable was fainter than the magnitude expressed. This occurs when the variable was invisible. It is then said to be fainter, by one or two grades, than the faintest comparison star which is distinctly seen, and in this case also the magnitude is expressed only to tenths. Four dots in this column indicate that the comparison was impossible. Since Messier 3 is an extremely condensed cluster and many of the variables lie somewhat near the centre, precise determinations of magnitude are often difficult. The second column contains the phase, or time elapsed since the preceding computed maximum. The formula by which these quantities are derived will be found in Chapter III. The third column contains the residuals, expressed in hundredths of a magnitude, between the individual magnitudes and the smooth curve drawn

through all the measures used in the determination of the period. The residuals, when positive, denote that the measured magnitude is fainter, and when negative, that it is brighter, than is indicated by the light curve as determined. Negative residuals are indicated by Italics. The columns giving the phase and residuals are left blank when no satisfactory period was found. When the residual was 0.40, or greater, the star has been remeasured, and the results are given in Table XI. When the remeasure gave a value differing by 0.40 from the original measure, the photograph was independently examined a third time in order to decide which observation was in error. When the original measure was incorrect, the corresponding residual has been replaced by the letter R, and the corrected magnitude and residual may be found in Table XI.

In all cases, the phases have been computed on the assumption that the period of the variable is perfectly uniform. In a few cases, a secular variation in the length of the period is indicated by the observations. This variation in many stars has the appearance of an oscillation in the duration of the period, which may be represented by a sine term in the formula for the return of maximum. The simple formula has been used in all cases for the determination of the phases given in Table IX, but when the addition of a sine term seems desirable, it is indicated by the letter R in the Table of the Elements of the Variables, page 61, and further details will be found in the remarks following that table. For a fuller discussion of the secular variations, see page 55.

TABLE IX

OBSERVATIONS OF THE VARIABLES

J. D.	No. 1.	Per. 0d.52065		No. 2.	Per. not det'd.		No. 3.	Per. 0.d55906		No. 4.	Per. not det'd.		No. 5.	Per. 0d.50587		No. 6.	Per. 0d.51433	
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		d.			d.			d.			d.			d.			d.	
3372.527	14.46	0.047	*28*	15.28	. . .	..	15.08	0.526	21	14.46	. . .	..	16.70	0.425	*05*	14.79	0.007	37
3377.517	16.66	0.351	00	16.12	. . .	..	16.66	0.484	14	15.08	. . .	..	16.60	0.356	*16*	16.94	0.368	09
3383.513	15.49	0.099	18	15.70	. . .	..	16.85	0.331	17	14.74	. . .	..	16.94	0.282	24	16.31	0.192	00
3384.514	14.60	0.059	*23*	15.49	. . .	..	16.06	0.214	*07*	14.41	. . .	..	16.60	0.271	*09*	15.85	0.164	*30*
3664.674	15.28	0.109	*20*	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	15.80	0.179	*41*	14.69	0.015	11
3691.533	16.66	0.416	01	15.13	. . .	..	. . .	. . .	..	13.99	. . .	..	16.41	0.227	*14*	15.80	0.128	*12*
" .643	14.50	0.005	00	15.28	. . .	..	16.41	0.419	*30*	14.36	. . .	..	16.55	0.337	*20*	16.66	0.238	12
3692.540	16.49	0.381	*16*	14.98	. . .	..	15.85	0.198	*14*	15.08	. . .	..	16.31	0.222	*21*	15.44	0.107	*34*
4067.520	14.60	0.493	02	15.85	. . .	..	15.08	0.048	34	14.79	. . .	..	16.60	0.353	*15*	16.17	0.140	17
4071.577	16.27	0.385	*38*	15.70	. . .	..	15.90	0.192	*07*	14.79	. . .	..	16.66	0.363	*10*	15.85	0.083	28
4073.585	16.27	0.310	*39*	16.00	. . .	..	14.79	0.523	*16*	14.36	. . .	..	16.60	0.347	*15*	15.18	0.033	25
4077.492	15.08	0.052	28	15.28	. . .	..	15.44	0.516	13	14.79	. . .	..	16.60	0.207	19	16.88	0.340	05
" .581	16.00	0.141	12	15.28	. . .	..	14.74	0.046	00	14.05	. . .	..	16.79	0.296	07	16.23	0.429	*61*
4078.492	14.74	0.011	23	15.28	. . .	..	16.98	0.398	27	14.69	. . .	..	16.70	0.195	37	16.70	0.311	*10*
4079.493	14.60	0.491	*10*	15.85	. . .	..	16.12	0.281	*44*	14.69	. . .	..	16.70	0.185	44	16.60	0.283	*15*
" .579	15.08	0.056	28	15.70	. . .	..	16.70	0.367	00	14.79	. . .	..	16.85	0.271	16	16.82	0.369	*02*
4437.550	16.66	0.341	00	15.70	. . .	..	16.70	0.540	208	14.74	. . .	..	15.08	0.086	*02*	16.94	0.367	10
4456.502	14.57	0.029	*02*	15.28	. . .	..	16.41	0.484	*09*	14.69	. . .	..	16.70	0.321	*03*	16.94	0.289	20
" .575	15.49	0.102	11	15.28	. . .	..	14.79	0.557	29	14.46	. . .	..	16.85	0.394	10	16.70	0.362	*14*
4839.480	16.66	0.329	00	16.36	. . .	..	. . .	. . .	..	. . .	. . .	..	16.70	0.355	*05*	15.85	0.091	21
4840.523	16.66	0.330	00	16.49	. . .	..	16.94	0.431	23	. . .	. . .	..	16.70	0.386	*06*	16.12	0.105	35
4841.472	16.66	0.238	04	16.00	. . .	..	. . .	. . .	..	. . .	. . .	..	16.70	0.324	*04*	15.29	0.026	51
" .503	16.66	0.269	00	16.23	. . .	..	. . .	. . .	..	. . .	. . .	..	16.60	0.355	*15*	15.44	0.057	14
" .571	16.70	0.337	04	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	16.92	0.423	18	16.21	0.125	31
" .603	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	16.12	0.157	03
5160.741	16.98	0.349	32	. . .	. . .	..	16.70	0.307	06	15.54	. . .	..	16.70	0.389	*06*	17.04	0.410	18
" .779	16.49	0.387	*16*	15.70	. . .	..	16.60	0.345	*10*	14.69	. . .	..	16.98	0.427	24	16.88	0.448	08
" .788	16.49	0.396	*16*	15.70	. . .	..	16.70	0.354	00	. . .	. . .	..	16.66	0.436	*07*	16.88	0.457	30
" .800	16.49	0.408	*16*	15.70	. . .	..	16.79	0.366	09	14.74	. . .	..	16.60	0.448	*10*	15.90	0.469	14
" .809	16.60	0.417	*04*	15.85	. . .	..	16.70	0.375	00	14.79	. . .	..	16.60	0.457	*07*	14.69	0.478	18
" .822	16.70	0.430	06	15.70	. . .	..	16.66	0.388	*05*	15.08	. . .	..	16.06	0.470	00	14.31	0.491	*09*
" .830	16.70	0.438	06	15.70	. . .	..	16.70	0.396	*01*	14.64	. . .	..	15.32	0.478	*03*	14.31	0.499	*09*
" .843	16.70	0.451	07	15.70	. . .	..	16.60	0.409	*11*	14.74	. . .	..	15.29	0.491	R	14.46	0.512	05
" .853	16.49	0.461	00	. . .	. . .	..	16.98	0.419	27	14.36	. . .	..	14.36	0.501	*04*	14.41	0.008	*05*
5161.713	16.66	0.280	00	16.00	. . .	..	15.66	0.161	00	14.26	. . .	..	16.70	0.349	*04*	16.94	0.353	10
" .722	16.76	0.289	10	15.85	. . .	..	15.85	0.170	12	14.15	. . .	..	16.70	0.358	*06*	16.98	0.362	14
" .735	16.66	0.302	00	16.00	. . .	..	16.06	0.183	18	14.10	. . .	..	16.60	0.371	*17*	16.76	0.375	*09*
" .744	16.70	0.311	04	15.85	. . .	..	15.98	0.192	00	14.05	. . .	..	16.70	0.380	*06*	16.66	0.384	*20*
" .756	16.49	0.323	*17*	15.70	. . .	..	16.16	0.204	10	14.05	. . .	..	16.76	0.392	00	16.70	0.396	*16*
" .764	16.70	0.331	04	16.00	. . .	..	16.36	0.212	23	14.15	. . .	..	16.76	0.400	00	16.88	0.404	02
" .777	16.66	0.344	00	15.70	. . .	..	15.94	0.225	*27*	14.31	. . .	..	16.88	0.413	13	16.70	0.417	*16*
" .786	16.66	0.353	00	16.12	. . .	..	16.41	0.234	14	14.20	. . .	..	16.88	0.422	14	16.94	0.426	10
" .799	16.70	0.366	04	16.00	. . .	..	16.70	0.247	36	14.41	. . .	..	16.76	0.435	04	16.88	0.439	05
" .808	16.60	0.375	*06*	16.00	. . .	..	16.60	0.256	19	14.36	. . .	..	16.70	0.444	00	16.70	0.448	*06*
" .820	16.66	0.387	00	16.00	. . .	..	16.70	0.268	21	14.31	. . .	..	16.60	0.456	*06*	16.66	0.460	12
" .828	16.49	0.395	*17*	16.23	. . .	..	16.60	0.276	07	14.36	. . .	..	16.56	0.464	06	16.12	0.468	02
" .840	16.49	0.407	*16*	16.00	. . .	..	16.70	0.288	12	14.31	. . .	..	15.54	0.476	00	14.69	0.480	19
" .850	16.70	0.417	06	16.00	. . .	..	16.60	0.298	00	14.46	. . .	..	15.08	0.486	00	14.41	0.490	00
" .864	16.70	0.431	06	15.85	. . .	..	16.66	0.312	00	14.69	. . .	..	14.41	0.500	00	14.31	0.504	*08*
" .873	16.70	0.440	06	15.85	. . .	..	16.79	0.321	12	14.36	. . .	..	14.20	0.003	*15*	14.20	0.513	*20*

J. D.	No. 7.	Per. 0d.49743		No. 8.	Per. not det'd.		No. 9.	Per. 0d.54157		No. 10.	Per. 0d.56950		No. 11.	Per. 0d.50790		No. 12.	Per. not det'd.	
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		d.			d.			d.			d.			d.			d.	
3372.527	16.23	0.433	17	14.31	. . .	..	16.00	0.497	30	15.54	0.530	25	14.31	0.029	15	15.28	. . .	..
3377.517	16.36	0.449	08	14.79	. . .	..	15.13	0.071	05	16.66	0.394	04	16.41	0.448	12	16.23	. . .	..
3383.513	. . .	. . .	..	14.41	. . .	..	15.54	0.110	18	15.54	0.125	13	16.66	0.349	07	16.00	. . .	..
3384.514	. . .	. . .	..	14.41	. . .	..	14.92	0.028	32	15.03	0.558	23	16.60	0.334	02	16.16	. . .	..
3664.674	. . .	. . .	..	. . .	. . .	..	16.12	0.196	36	16.31	0.523	R	15.54	0.133	17	15.13	. . .	..
3691.533	14.50	0.089	88	14.15	. . .	..	15.13	0.519	13	14.84	0.046	03	14.69	0.073	24	16.12	. . .	..
" .643	. . .	. . .	..	14.15	. . .	..	15.54	0.087	22	16.06	0.156	00	16.24	0.183	03	15.49	. . .	..
3692.540	. . .	. . .	..	14.31	. . .	..	16.49	0.443	27	16.41	0.484	29	14.74	0.065	07	16.23	. . .	..
4067.520	14.98	0.019	52	14.79	. . .	..	16.23	0.114	48	16.41	0.163	23	16.41	0.214	04	16.23	. . .	..
4071.577	. . .	. . .	..	14.36	. . .	..	16.82	0.380	06	16.66	0.233	04	16.82	0.208	39	15.49	. . .	..
4073.585	. . .	. . .	..	14.31	. . .	..	16.66	0.222	04	14.79	0.533	44	16.66	0.185	38	16.12	. . .	..
4077.492	14.98	0.043	30	14.31	. . .	..	16.82	0.338	06	16.88	0.454	18	14.92	0.028	49	14.92	. . .	..
" .581	16.12	0.132	25	14.36	. . .	..	16.82	0.427	06	14.84	0.543	13	16.12	0.117	62	15.18	. . .	..
4078.492	. . .	. . .	..	14.10	. . .	..	16.82	0.255	12	16.70	0.314	01	14.64	0.013	31	14.92	. . .	..
4079.493	15.70	0.054	88	14.41	. . .	..	16.66	0.173	34	16.48	0.177	15	14.53	0.506	21	15.08	. . .	..
" .579	. . .	. . .	..	14.31	. . .	..	16.70	0.259	01	16.94	0.263	27	15.44	0.084	38	16.00	. . .	..
4437.550	14.98	0.458	08	14.69	. . .	..	16.66	0.252	04	14.79	0.018	02	15.13	0.493	68	15.85	. . .	..
4456.502	14.50	0.011	08	14.20	. . .	..	16.66	0.249	03	16.66	0.176	34	15.70	0.145	13	14.79	. . .	..
" .575	15.70	0.084	R	14.74	. . .	..	16.82	0.322	07	16.60	0.249	09	16.31	0.218	14	15.28	. . .	..
4839.480	. . .	. . .	..	14.41	. . .	..	16.66	0.337	10	16.70	0.450	00	16.12	0.166	05	16.23	. . .	..
4840.523	. . .	. . .	..	15.08	. . .	..	16.82	0.297	08	16.70	0.355	00	16.51	0.194	16	15.28	. . .	..
4841.472	. . .	. . .	..	14.92	. . .	..	15.94	0.163	31	16.41	0.164	23	16.12	0.127	51	15.28	. . .	..
" .503	14.50	0.001	11	14.31	. . .	..	16.49	0.194	00	16.41	0.195	09	16.24	0.158	26	15.13	. . .	..
" .571	. . .	. . .	..	14.69	. . .	..	16.82	0.262	10	16.60	0.263	08	16.49	0.226	00	16.00	. . .	..
" .603	. . .	. . .	..	. . .	. . .	..	16.82	0.294	08	16.36	0.295	33	16.23	0.258	30	16.23	. . .	..
5160.741	16.66	0.387	18	15.54	. . .	..	16.66	0.447	10	16.70	0.514	03	16.12	0.435	R	16.23	. . .	..
" .779	16.49	0.425	05	14.69	. . .	..	16.82	0.485	08	15.13	0.552	29	15.13	0.473	47	16.23	. . .	..
" .788	16.36	0.434	06	14.41	. . .	..	16.66	0.494	03	15.08	0.561	30	14.69	0.482	00	16.36	. . .	..
" .800	16.23	0.446	09	14.31	. . .	..	16.00	0.506	52	14.84	0.003	08	14.20	0.494	26	16.36	. . .	..
" .809	15.28	0.455	00	14.41	. . .	..	15.18	0.515	18	14.69	0.012	07	14.26	0.503	06	16.23	. . .	..
" .822	14.79	0.468	19	14.69	. . .	..	14.60	0.528	14	14.64	0.025	14	14.20	0.008	11	16.36	. . .	..
" .830	14.50	0.476	02	14.41	. . .	..	14.60	0.536	10	14.79	0.033	02	14.31	0.016	02	15.94	. . .	..
" .843	14.36	0.489	06	14.31	. . .	..	14.41	0.007	17	15.08	0.046	22	14.41	0.029	02	16.12	. . .	..
" .853	14.36	0.001	03	14.36	. . .	..	14.60	0.017	01	14.84	0.056	07	14.60	0.039	07	15.49	. . .	..
5161.713	16.49	0.363	00	14.57	. . .	..	16.82	0.336	07	16.70	0.347	00	16.24	0.391	36	16.23	. . .	..
" .722	16.36	0.372	13	14.41	. . .	..	16.82	0.345	07	16.76	0.356	06	16.60	0.400	00	16.36	. . .	..
" .735	16.49	0.385	00	14.31	. . .	..	16.70	0.358	05	16.70	0.369	00	16.60	0.413	00	16.36	. . .	..
" .744	16.49	0.394	00	14.31	. . .	..	16.66	0.367	10	16.70	0.378	00	16.66	0.422	07	16.23	. . .	..
" .756	16.36	0.406	12	14.15	. . .	..	16.82	0.379	06	16.70	0.390	00	16.70	0.434	13	16.23	. . .	..
" .764	16.49	0.414	03	13.88	. . .	..	16.82	0.387	06	16.94	0.398	24	16.79	0.442	24	16.36	. . .	..
" .777	16.66	0.427	16	13.88	. . .	..	16.82	0.400	06	16.66	0.411	04	16.60	0.455	12	16.23	. . .	..
" .786	16.49	0.436	09	14.15	. . .	..	16.66	0.409	10	16.70	0.420	00	16.12	0.464	00	16.24	. . .	..
" .799	16.23	0.449	10	14.15	. . .	..	16.70	0.422	06	16.66	0.433	04	14.92	0.477	68	15.35	. . .	..
" .808	14.98	0.458	08	14.31	. . .	..	16.66	0.431	10	16.60	0.442	10	14.23	0.486	42	15.28	. . .	..
" .820	14.50	0.470	01	14.31	. . .	..	16.70	0.443	06	16.76	0.454	06	14.23	0.498	19	14.79	. . .	..
" .828	. . .	. . .	..	14.15	. . .	..	16.82	0.451	06	16.66	0.462	04	14.10	0.506	22	14.92	. . .	..
" .840	14.41	0.490	00	14.31	. . .	..	16.82	0.463	06	16.76	0.474	06	14.20	0.010	12	14.95	. . .	..
" .850	14.41	0.003	01	14.31	. . .	..	16.82	0.473	06	16.66	0.484	04	14.36	0.020	02	14.69	. . .	..
" .864	14.50	0.014	07	14.41	. . .	..	16.82	0.487	07	16.70	0.498	00	14.53	0.034	04	14.69	. . .	..
" .873	14.50	0.026	01	14.20	. . .	..	16.66	0.496	03	16.70	0.507	01	14.74	0.043	12	14.57	. . .	..

J. D.	No. 13. Per. 0d.48307			No. 14. Per. 0d.63478			No. 15. Per. 0d.53008			No. 16. Per. 0d.51149			No. 17. Per. 0d.57612			No. 18. Per. 0d.51633		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		d.			d.			d.			d.			d.			d.	
3372.527	16.12	0.406	47	16.49	0.259	00	16.66	0.307	06	16.23	0.161	22	16.00	0.116	00	15.13	0.027	08
3377.517	15.13	0.083	19	15.73	0.171	19	14.98	0.526	36	14.95	0.036	00	16.82	0.497	05	16.66	0.370	11
3383.513	16.49	0.282	07	16.49	0.454	00	16.23	0.161	14	16.66	0.406	00	16.23	0.155	15	16.23	0.170	02
3384.514	16.36	0.317	24	16.00	0.185	06	15.13	0.102	42	16.82	0.384	00	14.98	0.004	01	16.23	0.138	21
3664.674	16.82	0.296	24	16.66	0.407	11	16.49	0.380	12	16.66	0.247	00	16.36	0.170	12	16.82	0.448	10
3691.533	14.69	0.103	41	14.46	0.606	05	16.23	0.205	16	14.50	0.509	10	16.36	0.527	00	....	....	..
" .643	16.23	0.213	14	15.32	0.081	32	16.49	0.315	11	15.85	0.107	33	15.18	0.061	18	15.28	0.051	02
3692.540	15.32	0.144	18	16.49	0.343	06	....	....	..	14.98	0.493	35	16.82	0.382	04	16.82	0.432	06
4067.520	16.49	0.262	00	16.49	0.168	61	16.82	0.365	20	15.28	0.039	38	16.82	0.308	05	15.28	0.040	03
4071.577	14.74	0.454	48	16.66	0.416	12	16.49	0.182	22	14.79	0.004	03	16.66	0.332	12	14.98	0.483	12
4073.585	14.74	0.047	05	15.32	0.520	00	15.85	0.069	77	14.74	0.478	14	15.54	0.035	43	16.70	0.425	06
4077.492	15.18	0.089	18	14.74	0.619	24	16.82	0.266	22	16.94	0.293	11	15.70	0.486	107	16.70	0.202	24
" .581	16.06	0.178	26	15.49	0.073	57	16.82	0.355	20	16.98	0.382	16	15.28	0.575	25	16.82	0.291	11
4078.492	15.69	0.123	40	16.66	0.349	11	16.49	0.206	09	16.94	0.270	18	16.94	0.334	16	16.66	0.169	43
4079.493	16.00	0.158	38	15.32	0.080	35	16.00	0.146	02	16.82	0.248	16	16.66	0.182	13	16.49	0.137	47
" .579	16.36	0.244	00	16.00	0.166	10	16.66	0.232	15	16.82	0.334	02	16.66	0.268	10	16.70	0.223	15
4437.550	16.49	0.260	02	15.70	0.121	34	16.82	0.399	20	16.70	0.262	02	16.82	0.469	03	16.82	0.378	06
4456.502	16.49	0.372	11	14.74	0.030	12	16.82	0.268	22	16.82	0.289	01	16.82	0.409	03	16.66	0.225	11
" .575	16.23	0.445	25	15.18	0.103	01	16.49	0.341	13	16.82	0.362	01	16.82	0.482	04	16.82	0.298	10
4839.480	16.66	0.276	13	16.36	0.236	06	14.79	0.529	19	16.23	0.161	22	16.66	0.267	09	15.70	0.086	06
4840.523	16.66	0.353	06	14.99	0.009	46	14.95	0.512	08	16.49	0.181	29	16.49	0.158	10	15.70	0.097	02
4841.472	16.66	0.336	06	16.49	0.323	05	16.66	0.400	04	15.44	0.107	10	15.54	0.531	76	15.49	0.013	49
" .503	16.49	0.366	11	16.49	0.354	06	16.49	0.431	11	15.54	0.138	26	15.18	0.562	05	15.28	0.044	02
" .571	16.23	0.434	00	16.49	0.422	05	15.44	0.499	36	16.49	0.206	12	15.49	0.054	21	15.85	0.112	02
" .603	14.41	0.466	34	16.49	0.454	00	14.74	0.001	24	....	....	..	16.00	0.086	35	....	....	..
5160.741	16.66	0.295	08	16.49	0.298	03	14.46	0.031	26	....	....	..	....	....	..	....	....	..
" .779	16.49	0.333	11	16.66	0.336	11	14.92	0.069	16	16.66	0.244	03	15.70	0.091	00	16.66	0.228	09
" .788	16.66	0.342	06	16.49	0.345	06	15.70	0.078	50	16.60	0.253	08	16.23	0.100	41	16.66	0.237	07
" .800	16.66	0.354	06	16.66	0.357	11	15.13	0.090	27	16.70	0.265	03	16.16	0.112	20	16.66	0.249	03
" .809	16.66	0.363	06	16.66	0.366	10	15.70	0.099	22	16.66	0.274	12	16.23	0.121	19	16.66	0.258	00
" .822	16.41	0.376	19	16.66	0.379	10	15.28	0.112	R	16.82	0.287	01	16.23	0.134	01	16.66	0.271	02
" .830	16.41	0.384	19	16.49	0.387	06	15.49	0.120	23	16.82	0.295	00	16.12	0.142	18	16.70	0.279	01
" .843	16.70	0.397	10	16.66	0.400	11	15.85	0.133	00	16.70	0.308	14	16.36	0.155	02	16.66	0.292	06
" .853	16.49	0.407	09	16.49	0.410	06	16.12	0.143	18	16.94	0.318	10	16.36	0.165	08	16.82	0.302	09
5161.713	16.36	0.301	23	14.36	0.000	14	16.49	0.473	04	15.80	0.155	12	16.66	0.449	13	15.85	0.130	13
" .722	16.49	0.310	11	14.36	0.009	16	16.66	0.482	18	16.23	0.164	18	16.82	0.458	03	15.70	0.139	31
" .735	16.49	0.323	11	14.41	0.022	18	16.36	0.495	10	16.12	0.177	01	16.70	0.471	09	16.00	0.152	13
" .744	16.66	0.332	06	14.60	0.031	02	15.49	0.504	25	16.00	0.186	22	16.82	0.480	03	15.85	0.161	35
" .756	16.49	0.344	11	14.46	0.043	24	14.74	0.516	03	16.12	0.198	18	16.82	0.492	04	16.23	0.173	03
" .764	16.66	0.352	06	14.60	0.051	15	14.41	0.524	21	16.23	0.206	15	16.82	0.500	05	16.12	0.181	20
" .777	16.70	0.365	10	14.69	0.064	16	14.46	0.007	06	16.36	0.219	10	16.66	0.513	04	16.12	0.194	28
" .786	16.49	0.374	11	14.60	0.073	32	14.41	0.016	15	16.36	0.228	15	16.49	0.522	01	16.36	0.203	08
" .799	16.66	0.387	06	15.13	0.086	13	14.69	0.029	00	16.49	0.241	13	16.12	0.535	00	16.49	0.216	01
" .808	16.49	0.396	11	15.35	0.095	25	14.92	0.038	14	16.36	0.250	31	15.49	0.544	11	16.36	0.225	18
" .820	16.66	0.408	08	15.32	0.107	12	14.74	0.050	16	16.60	0.262	12	14.98	0.556	22	16.66	0.237	07
" .828	16.66	0.416	10	15.35	0.115	07	15.13	0.058	19	16.66	0.270	09	15.28	0.564	16	16.70	0.245	09
" .840	16.49	0.428	00	15.49	0.127	08	15.13	0.070	02	16.70	0.282	11	15.28	0.000	28	16.66	0.257	00
" .850	16.00	0.438	23	15.32	0.137	20	15.28	0.080	03	16.70	0.292	12	14.79	0.010	21	16.70	0.267	03
" .864	14.92	0.452	R	15.85	0.151	16	16.00	0.094	54	16.94	0.306	10	15.13	0.024	08	16.82	0.281	12
" .873	14.60	0.461	20	16.12	0.160	34	15.85	0.103	30	16.82	0.315	02	15.28	0.033	18	16.82	0.290	10

J. D.	No. 19. Per. 0d.41172			No. 20. Per. 0d.49129			No. 21. Per. 0d.51646			No. 22. Per. 0d.48146			No. 23. Per. 0d.50777			No. 24. Per. 0d.66458		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		d.			d.			d.			d.			d.			d.	
3372.527	16.06	0.132	32	16.94	0.458	235	15.90	0.107	21	16.66	0.327	21	14.50	0.047	14	14.69	0.017	12
3377.517	16.98	0.181	32	14.79	0.044	03	16.79	0.449	00	15.80	0.021	R	15.85	0.255	21	16.60	0.355	13
3383.513	16.60	0.002	100	15.44	0.145	37	16.94	0.247	20	16.66	0.239	02	16.00	0.273	28	16.60	0.370	12
3384.514	16.36	0.179	29	15.54	0.163	46	16.60	0.215	00	16.70	0.278	10	14.79	0.079	02	15.08	0.042	20
3664.674	15.90	0.370	03	16.31	0.288	38	16.94	0.454	21	16.41	0.228	22	15.85	0.482	13	16.41	0.413	11
3691.533	15.54	0.055	15	15.80	0.126	17	16.70	0.457	00	15.54	0.125	46	16.12	0.442	10	15.29	0.025	47
" .643	16.36	0.165	24	16.31	0.236	17	15.08	0.051	03	16.66	0.235	01	14.46	0.552	16	14.79	0.135	53
3692.540	16.41	0.239	36	15.18	0.150	68	17.2	0.431	..	16.51	0.169	19	16.31	0.253	68	16.41	0.367	07
4067.520	16.60	0.142	11	16.94	0.276	30	15.90	0.461	20	15.54	0.092	00	15.70	0.431	32	16.41	0.524	19
4071.577	15.90	0.082	07	16.94	0.403	17	16.94	0.387	05	17.04	0.297	19	15.28	0.304	56	15.54	0.593	00
4073.585	15.98	0.031	36	15.18	0.445	20	16.60	0.329	26	16.94	0.379	05	16.12	0.519	24	15.08	0.608	09
4077.492	16.70	0.232	06	16.24	0.422	36	15.54	0.104	10	15.44	0.435	28	15.28	0.241	30	16.60	0.527	00
" .581	16.88	0.321	06	14.69	0.020	12	16.60	0.193	13	14.69	0.042	03	15.49	0.330	43	15.08	0.616	11
4078.492	15.66	0.409	06	15.85	0.440	15	15.66	0.071	37	14.46	0.472	07	16.00	0.046	137	16.24	0.198	38
4079.493	16.56	0.175	09	14.79	0.458	23	15.08	0.039	07	14.69	0.028	21	16.06	0.449	05	16.66	0.534	06
" .579	16.70	0.261	09	14.79	0.053	10	16.06	0.125	17	15.80	0.114	05	16.00	0.535	30	14.79	0.620	12
4437.550	15.80	0.035	17	16.70	0.365	07	16.31	0.189	10	17.04	0.360	15	16.12	0.442	10	16.70	0.383	20
4456.502	15.80	0.048	13	16.41	0.156	49	15.08	0.032	10	14.74	0.054	18	16.31	0.265	R	14.95	0.062	00
" .575	16.06	0.121	22	16.70	0.229	27	15.85	0.105	19	16.06	0.127	03	16.36	0.338	42	15.54	0.135	22
4839.480	15.80	0.127	46	15.54	0.419	118	16.82	0.314	02	16.94	0.271	15	14.79	0.072	02	16.70	0.242	54
4840.523	16.51	0.346	23	14.69	0.480	23	16.94	0.324	09	16.94	0.351	05	15.70	0.518	20	15.08	0.620	13
4841.472	15.80	0.060	08	15.08	0.446	18	16.70	0.240	00	16.98	0.338	10	15.49	0.271	24	15.90	0.240	26
" .503	16.36	0.091	46	14.79	0.477	32	16.94	0.271	13	16.94	0.369	04	15.70	0.302	14	16.41	0.271	12
" .571	16.98	0.159	40	15.44	0.054	R	16.98	0.339	11	15.54	0.437	51	16.23	0.370	24	16.36	0.339	09
" .603	16.3	0.191	..	15.85	0.086	62	....	....	..	14.79	0.469	35	....	....	..	....	....	..
5160.741	16.60	0.246	18	16.70	0.377	08	16.70	0.336	17	16.98	0.399	18	....	....	..	16.66	0.511	07
" .779	16.79	0.284	02	16.94	0.415	20	16.94	0.374	05	16.31	0.437	15	16.12	0.369	13	16.60	0.549	00
" .788	16.70	0.293	11	16.70	0.424	12	16.94	0.383	04	15.54	0.446	34	16.23	0.378	23	16.70	0.558	11
" .800	16.66	0.305	11	16.16	0.436	08	16.94	0.395	05	14.79	0.458	00	15.70	0.390	31	16.70	0.570	13
" .809	16.94	0.314	12	14.79	0.445	00	16.70	0.404	18	14.41	0.467	05	15.85	0.399	16	16.60	0.579	03
" .822	16.79	0.327	02	14.23	0.458	32	16.88	0.417	01	14.31	0.480	07	16.00	0.412	02	16.41	0.592	00
" .830	16.94	0.335	15	14.20	0.466	29	16.94	0.425	06	14.36	0.006	01	15.85	0.420	17	15.90	0.600	40
" .843	16.82	0.348	05	14.41	0.479	05	16.76	0.438	08	14.41	0.019	04	16.12	0.433	10	15.29	0.613	29
" .853	16.82	0.358	14	14.36	0.489	10	17.04	0.448	24	14.64	0.029	16	16.12	0.443	11	15.08	0.623	18
5161.713	15.44	0.395	16	16.60	0.366	18	16.70	0.276	12	16.70	0.408	06	15.13	0.107	23	15.49	0.154	01
" .722	15.54	0.404	06	16.60	0.375	18	16.82	0.285	00	16.70	0.417	01	15.08	0.116	14	15.54	0.163	04
" .735	15.80	0.005	20	16.82	0.388	04	16.88	0.298	05	16.36	0.430	00	14.98	0.129	03	15.90	0.176	22
" .744	15.44	0.014	17	16.66	0.397	11	16.70	0.307	15	15.94	0.439	00	15.13	0.138	07	15.54	0.185	22
" .756	15.80	0.026	18	16.98	0.409	22	16.82	0.319	03	15.54	0.451	66	....	....	..	15.80	0.197	05
" .764	15.85	0.034	22	16.88	0.417	15	17.04	0.327	18	14.69	0.459	06	15.13	0.158	02	15.66	0.205	26
" .777	15.44	0.047	23	16.16	0.430	00	16.76	0.340	11	14.26	0.472	14	15.49	0.171	26	15.63	0.218	37
" .786	15.85	0.056	15	15.13	0.439	27	16.76	0.349	12	14.41	0.481	04	15.18	0.180	09	15.66	0.227	R
" .799	16.66	0.069	R	14.31	0.452	37	16.76	0.362	12	14.31	0.012	04	15.28	0.193	04	16.31	0.240	14
" .808	16.16	0.078	36	14.36	0.461	15	16.66	0.371	23	14.36	0.021	03	15.70	0.202	31	16.21	0.249	01
" .820	16.16	0.090	27	14.36	0.473	11	16.76	0.383	13	14.74	0.033	20	15.28	0.214	15	16.56	0.261	29
" .828	16.41	0.098	46	14.53	0.481	07	16.88	0.391	01	14.79	0.041	08	15.70	0.222	19	16.31	0.269	04
" .840	16.21	0.110	11	14.41	0.002	06	16.88	0.403	01	14.92	0.053	02	15.49	0.234	05	16.31	0.281	00
" .850	16.31	0.120	10	14.57	0.012	05	16.70	0.413	18	15.13	0.063	00	15.70	0.244	09	16.16	0.291	18
" .864	16.41	0.134	03	14.89	0.026	20	16.70	0.427	17	15.44	0.077	15	15.70	0.258	05	16.06	0.305	32
" .873	16.60	0.143	10	14.74	0.035	02	16.88	0.436	01	15.85	0.086	35	16.00	0.267	31	16.36	0.314	04

J. D.	No. 25. Per. 0d.47990			No. 26. Per. 0d.59775			No. 27. Per. 0d.58006			No. 28. Per. 0d.47566			No. 29. Per. not det'd.			No. 30. Per. not det'd.		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		d.			d.			d.			d.			d.			d.	
3372.527	16.82	0.374	12	16.60	0.481	16	16.70	0.278	05	16.23	0.230	07	14.22	....	..	14.69	....	..
3377.517	15.90	0.085	60	15.80	0.091	54	15.49	0.047	00	14.50	0.463	07	14.69	....	..	16.92	....	..
3383.513	16.94	0.322	20	15.80	0.109	35	16.49	0.243	13	16.36	0.276	06	14.69	....	..	16.36	....	..
3384.514	16.70	0.364	00	16.16	0.512	00	15.49	0.084	41	16.12	0.325	18	14.46	....	..	15.44	....	..
3664.674	16.60	0.262	12	....	....	..	15.70	0.075	08	16.00	0.322	30	14.50	....	..	....	....	..
3691.533	16.41	0.247	29	16.36	0.288	22	16.23	0.251	40	15.32	0.068	12	14.22	....	..	14.31	....	..
" .643	16.66	0.357	04	16.41	0.398	19	16.66	0.361	01	16.23	0.178	01	14.69	....	..	14.69	....	..
3692.540	16.60	0.294	13	15.08	0.100	24	15.13	0.098	91	16.00	0.124	01	14.36	....	..	14.41	....	..
4067.520	15.08	0.472	38	16.41	0.290	17	16.82	0.359	14	15.70	0.284	60	14.46	....	..	15.80	....	..
4071.577	16.41	0.210	23	16.31	0.163	31	16.49	0.356	19	15.18	0.060	15	14.74	....	..	15.08	....	..
4073.585	16.94	0.298	20	16.60	0.378	00	15.44	0.043	00	15.32	0.165	86	14.31	....	..	14.74	....	..
4077.492	16.98	0.366	28	15.54	0.100	20	16.36	0.470	00	16.23	0.267	07	14.69	....	..	16.06	....	..
" .581	14.74	0.455	26	16.31	0.189	13	14.84	0.559	21	16.23	0.356	07	14.46	....	..	14.64	....	..
4078.492	16.60	0.406	12	16.16	0.503	10	16.82	0.310	15	16.36	0.315	06	14.98	....	..	16.06	....	..
4079.493	14.69	0.447	56	16.66	0.308	06	16.49	0.151	04	16.36	0.365	06	14.98	....	..	15.08	....	..
" .579	15.08	0.053	26	16.70	0.394	10	16.66	0.237	04	16.12	0.451	41	14.69	....	..	15.44	....	..
4437.550	14.69	0.019	02	16.79	0.313	19	16.49	0.311	18	15.49	0.250	81	14.69	....	..	15.80	....	..
4456.502	16.70	0.255	02	15.59	0.137	13	16.23	0.121	08	16.23	0.176	01	14.57	....	..	15.44	....	..
" .575	16.70	0.328	03	16.06	0.210	24	16.36	0.194	20	16.23	0.249	07	14.69	....	..	14.69	....	..
4839.480	16.98	0.273	25	15.44	0.555	04	16.66	0.259	03	16.49	0.247	19	14.98	....	..	....	....	..
4840.523	16.41	0.356	31	16.31	0.403	29	16.49	0.142	09	16.49	0.339	19	15.28	....	..	....	....	..
4841.472	16.70	0.345	02	16.31	0.156	38	15.54	0.511	00	16.49	0.337	19	15.18	....	..	....	....	..
" .503	16.41	0.376	29	16.31	0.187	15	15.32	0.542	14	16.36	0.368	06	14.98	....	..	....	....	..
" .571	15.32	0.444	00	16.70	0.255	19	....	....	..	16.23	0.436	20	14.79	....	..	....	....	..
" .603	15.18	0.476	48	....	....	..	....	....	..	....	....	..	14.79	....	..	....	....	..
5160.741	14.92	0.001	28	16.60	0.227	22	16.66	0.167	15	15.70	0.438	33	....	....	..	16.06	....	..
" .779	14.69	0.039	04	16.70	0.265	16	16.82	0.205	24	14.50	0.000	00	14.26	....	..	15.08	....	..
" .788	14.79	0.048	03	16.70	0.274	13	16.66	0.214	07	14.46	0.009	04	14.31	....	..	14.79	....	..
" .800	14.79	0.060	09	16.56	0.286	03	16.49	0.226	12	14.50	0.021	06	14.31	....	..	15.18	....	..
" .809	14.79	0.069	20	16.60	0.295	02	16.66	0.235	05	14.50	0.030	10	14.36	....	..	15.08	....	..
" .822	15.18	0.082	12	16.70	0.308	10	16.82	0.248	19	14.69	0.043	04	14.46	....	..	15.18	....	..
" .830	15.80	0.090	30	16.56	0.316	04	16.66	0.256	03	14.79	0.051	09	14.46	....	..	15.44	....	..
" .843	16.06	0.103	34	16.70	0.329	10	16.66	0.269	02	15.32	0.064	20	14.50	....	..	15.44	....	..
" .853	16.12	0.113	21	16.60	0.339	00	16.66	0.279	00	14.92	0.074	40	14.46	....	..	15.08	....	..
5161.713	14.57	0.013	09	14.41	0.003	09	15.32	0.559	26	14.74	0.459	00	14.26	....	..	14.69	....	..
" .722	14.57	0.022	11	14.60	0.012	09	14.95	0.568	07	14.50	0.468	02	14.31	....	..	14.31	....	..
" .735	14.64	0.035	08	14.46	0.025	10	14.79	0.001	21	14.41	0.005	09	14.31	....	..	14.41	....	..
" .744	14.41	0.044	38	14.41	0.034	19	15.13	0.010	09	14.50	0.014	02	14.36	....	..	14.41	....	..
" .756	14.89	0.056	02	14.79	0.046	09	15.49	0.022	36	14.50	0.026	08	14.36	....	..	14.79	....	..
" .764	14.79	0.064	15	14.92	0.054	17	15.32	0.030	10	14.69	0.034	06	14.46	....	..	14.69	....	..
" .777	15.29	0.077	11	14.89	0.067	03	15.49	0.043	03	14.69	0.047	09	14.57	....	..	14.79	....	..
" .786	15.49	0.086	12	15.32	0.076	32	15.49	0.052	03	15.13	0.056	15	14.60	....	..	14.69	....	..
" .799	15.66	0.099	09	15.54	0.089	36	15.70	0.065	00	14.79	0.069	00	14.69	....	..	15.18	....	..
" .808	15.98	0.108	10	14.79	0.098	51	15.98	0.074	20	15.35	0.078	00	14.69	....	..	15.18	....	..
" .820	16.24	0.120	20	14.95	0.110	53	16.00	0.086	04	15.94	0.090	33	14.98	....	..	15.80	....	..
" .828	16.41	0.128	21	15.90	0.118	37	16.23	0.094	20	15.85	0.098	20	14.74	....	..	15.08	....	..
" .840	16.48	0.140	15	15.44	0.130	24	16.23	0.106	08	15.70	0.110	15	14.92	....	..	15.54	....	..
" .850	16.36	0.150	07	15.94	0.140	16	16.36	0.116	13	16.12	0.120	19	14.74	....	..	15.18	....	..
" .864	16.66	0.164	15	15.54	0.154	38	16.36	0.130	02	16.23	0.134	19	14.98	....	..	15.90	....	..
" .873	16.60	0.173	06	16.36	0.163	36	16.36	0.139	01	16.12	0.143	02	15.28	....	..	15.54	....	..

J. D.	No. 31. Per. 0d.58074			No. 32. Per. 0d.49536			No. 33. Per. 0d.52523			No. 34. Per. 0d.55909			No. 35. Per. 0d.53070			No. 36. Per. 0d.54557		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		d.			d.			d.			d.			d.			d.	
3372.527	16.23	0.277	15	16.00	0.457	135	14.46	0.007	25	16.16	0.147	04	16.66	0.397	01	15.08	0.493	12
3377.517	14.50	0.040	07	15.28	0.493	92	16.70	0.270	08	15.80	0.105	15	. . .	. . . .	..	15.13	0.027	23
3383.513	16.49	0.229	23	14.74	0.050	10	15.44	0.488	38	15.54	0.510	05	16.66	0.238	06	15.08	0.022	20
3384.514	14.41	0.068	35	14.50	0.060	26	16.60	0.439	16	16.70	0.393	00	16.23	0.178	12	16.60	0.477	07
3664.674	16.49	0.312	05	. . .	. . . .	..	16.31	0.126	23	16.41	0.449	29	15.49	0.128	34	16.82	0.214	18
3691.533	16.49	0.457	07	15.28	0.451	32	16.36	0.198	09	16.31	0.472	39	16.49	0.452	17	16.41	0.340	39
" .643	14.50	0.567	09	14.84	0.066	00	16.51	0.308	17	15.18	0.023	16	14.84	0.032	11	16.70	0.450	10
3692.540	16.23	0.302	20	15.13	0.467	53	16.21	0.155	05	16.41	0.361	29	16.66	0.398	01	16.98	0.256	26
4067.520	15.70	0.124	11	14.46	0.460	34	16.12	0.121	08	16.94	0.191	48	16.36	0.173	04	16.98	0.429	17
4071.577	15.49	0.126	08	15.28	0.059	55	14.69	0.501	16	16.70	0.335	02	15.28	0.515	00	16.31	0.122	20
4073.585	16.49	0.392	05	15.28	0.085	10	16.70	0.408	06	16.12	0.106	44	16.66	0.400	01	14.74	0.493	56
4077.492	16.00	0.234	28	14.50	0.029	01	15.66	0.113	29	15.90	0.100	30	15.18	0.062	19	15.08	0.036	11
" .581	16.23	0.323	24	16.00	0.118	30	16.60	0.202	13	16.60	0.189	14	16.00	0.151	12	16.16	0.125	02
4078.492	14.84	0.072	02	14.74	0.039	21	16.16	0.063	R	15.18	0.540	03	14.79	0.000	14	14.84	0.490	56
4079.493	16.23	0.492	25	15.28	0.049	65	15.18	0.013	41	16.60	0.423	10	16.82	0.471	19	16.94	0.400	13
" .579	14.50	0.578	01	16.00	0.135	03	15.80	0.099	00	15.18	0.509	44	14.79	0.026	08	15.08	0.486	52
4437.550	16.12	0.233	16	15.49	0.456	00	16.94	0.389	19	15.54	0.104	12	16.49	0.305	16	14.74	0.017	08
4456.502	14.41	0.020	10	15.13	0.089	09	16.41	0.433	35	15.18	0.046	06	15.49	0.152	65	16.94	0.420	15
" .575	14.79	0.093	18	15.70	0.162	55	15.13	0.506	35	15.54	0.119	28	16.23	0.225	35	16.70	0.493	140
4839.480	16.60	0.291	19	16.49	0.154	30	14.84	0.518	15	15.90	0.048	77	16.00	0.495	31	16.70	0.408	11
4840.523	16.49	0.172	47	16.49	0.206	04	14.79	0.510	05	15.54	0.532	26	16.49	0.477	12	16.79	0.360	02
4841.472	15.49	0.541	66	16.36	0.164	10	16.94	0.409	18	16.41	0.363	29	16.49	0.364	17	16.60	0.218	05
" .503	15.13	0.572	59	16.23	0.195	18	16.70	0.440	06	16.60	0.394	10	16.66	0.395	01	16.60	0.249	11
" .571	15.54	0.059	86	. . .	. . . .	..	14.79	0.508	00	16.66	0.462	04	16.82	0.463	19	16.70	0.317	10
" .603	. . .	. . . .	..	. . .	. . . .	..	14.74	0.015	01	15.90	0.494	30	16.49	0.495	22	. . .	. . . .	..
5160.741	16.66	0.403	12	16.82	0.421	27	16.79	0.338	07	16.94	0.391	24	16.49	0.152	36	16.88	0.328	08
" .779	16.49	0.441	07	14.50	0.459	30	16.88	0.376	14	16.70	0.429	00	16.49	0.190	05	16.70	0.366	11
" .788	16.49	0.450	07	14.31	0.468	27	16.76	0.385	01	16.70	0.438	00	16.49	0.199	00	16.60	0.375	21
" .800	16.49	0.462	06	14.10	0.480	30	16.66	0.397	10	16.70	0.450	00	16.66	0.211	11	16.88	0.387	07
" .809	16.49	0.471	04	14.22	0.489	15	16.70	0.406	06	16.94	0.459	24	16.49	0.220	07	16.60	0.396	21
" .822	16.60	0.484	09	14.31	0.007	05	16.70	0.419	06	16.70	0.472	00	16.49	0.233	10	16.98	0.409	17
" .830	16.60	0.492	12	14.41	0.015	04	16.66	0.427	10	16.60	0.480	06	16.66	0.241	06	16.70	0.417	11
" .843	16.36	0.505	02	14.50	0.028	03	16.70	0.440	06	16.60	0.493	10	16.66	0.254	05	16.94	0.430	13
" .853	15.85	0.515	00	14.50	0.038	02	16.94	0.450	22	16.56	0.503	71	16.82	0.264	20	16.94	0.440	14
5161.713	16.36	0.213	15	16.49	0.403	11	16.70	0.260	10	16.48	0.245	12	14.79	0.063	22	16.41	0.209	21
" .722	16.23	0.222	00	16.60	0.412	02	16.66	0.269	04	16.60	0.254	02	15.28	0.072	18	16.48	0.218	16
" .735	16.16	0.235	12	16.36	0.425	16	16.66	0.282	02	16.46	0.267	18	15.70	0.085	48	16.56	0.231	12
" .744	16.36	0.244	03	16.49	0.434	00	16.60	0.291	06	16.50	0.276	14	15.70	0.094	32	16.56	0.240	14
" .756	16.36	0.256	01	15.85	0.446	35	16.70	0.303	02	16.70	0.288	05	16.00	0.106	48	16.56	0.252	16
" .764	16.36	0.264	01	14.79	0.454	70	16.70	0.311	01	16.70	0.296	04	15.49	0.114	13	16.70	0.260	02
" .777	16.31	0.277	07	14.22	0.467	38	16.60	0.324	10	16.60	0.309	07	15.49	0.127	33	16.66	0.273	10
" .786	16.23	0.286	17	14.31	0.476	13	16.60	0.333	11	16.66	0.318	02	16.00	0.136	06	16.70	0.282	06
" .799	16.36	0.299	06	14.22	0.489	15	16.79	0.346	06	16.60	0.331	09	16.23	0.149	13	16.82	0.295	05
" .808	16.36	0.308	07	14.36	0.002	02	16.70	0.355	03	16.60	0.340	10	16.12	0.158	07	16.70	0.304	09
" .820	16.66	0.320	21	14.50	0.014	13	16.76	0.367	01	16.76	0.352	06	16.12	0.170	17	16.79	0.316	00
" .828	16.41	0.328	06	14.36	0.022	07	16.70	0.375	04	16.76	0.360	06	16.23	0.178	12	16.76	0.324	04
" .840	16.49	0.340	00	14.41	0.034	06	16.79	0.387	03	16.76	0.372	06	16.49	0.190	05	16.82	0.336	02
" .850	16.36	0.350	14	14.74	0.044	14	16.70	0.397	06	16.76	0.382	06	16.66	0.200	17	16.76	0.346	05
" .864	16.36	0.364	16	14.50	0.058	21	16.76	0.411	00	16.70	0.396	00	16.49	0.214	06	16.70	0.360	11
" .873	16.49	0.373	03	14.46	0.067	31	16.88	0.420	12	16.66	0.405	05	16.66	0.223	09	16.88	0.369	07

J. D.	No. 37. Per. not det'd.			No. 38. Per. 0.d56102			No. 39. Per. 0d.58709			No. 40. Per. 0d.55240			No. 41. Per. 0d.48568			No. 42. Per. 0d.59022		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		d.			d.			d.			d.			d			d.	
3372.527	16.36	. . .	..	15.18	0.067	06	15.28	0.007	66	14.79	0.021	07	16.24	0.147	*12*	14.74	0.087	*14*
3377.517	16.00	. . .	..	14.69	0.008	*11*	16.60	0.300	*05*	14.79	0.039	02	16.70	0.280	02	17.04	0.355	58
3383.513	15.44	. . .	..	16.70	0.394	*12*	16.66	0.425	*07*	16.12	0.511	*01*	16.06	0.448	R	16.98	0.449	37
3384.514	15.54	. . .	..	16.82	0.273	*07*	16.36	0.252	*17*	16.70	0.407	*13*	15.94	0.478	R	16.06	0.270	*08*
3664.674	15.49	. . .	..	16.66	0.484	*14*	16.66	0.370	*04*	16.36	0.500	*15*	16.70	0.400	11	14.74	0.075	00
3691.533	15.13	. . .	..	16.82	0.414	00	16.12	0.223	*33*	16.66	0.292	*11*	14.79	0.061	*30*	15.80	0.374	*72*
" .643	16.36	. . .	..	14.69	0.524	*26*	16.49	0.333	*21*	16.82	0.402	*01*	16.36	0.171	*07*	16.16	0.484	*47*
3692.540	15.28	. . .	..	16.82	0.299	03	15.13	0.056	07	15.85	0.194	*63*	15.66	0.097	00	15.90	0.201	09
4067.520	16.00	. . .	..	16.82	0.517	172	16.49	0.473	*23*	15.49	0.094	27	16.06	0.132	*24*	16.66	0.391	10
4071.577	16.31	. . .	..	15.08	0.086	*22*	16.82	0.420	09	16.82	0.285	06	16.66	0.303	*06*	16.41	0.316	10
4073.585	15.28	. . .	..	16.82	0.411	00	15.70	0.080	42	15.49	0.083	38	16.60	0.369	*15*	14.31	0.554	*49*
4077.492	15.28	. . .	..	16.49	0.391	*33*	16.66	0.464	*07*	15.70	0.123	00	16.06	0.390	*62*	16.41	0.329	03
" .581	15.18	. . .	..	16.70	0.480	*11*	15.18	0.553	00	16.66	0.212	07	14.69	0.479	33	16.60	0.418	00
4078.492	15.28	. . .	..	16.23	0.269	*51*	16.82	0.290	18	14.98	0.018	27	16.60	0.419	R	15.54	0.149	08
4079.493	15.18	. . .	..	15.54	0.148	*47*	15.85	0.117	17	16.82	0.467	*01*	14.79	0.449	*51*	14.41	0.560	*19*
" .579	15.54	. . .	..	16.23	0.234	*44*	16.36	0.203	01	14.79	0.001	09	15.18	0.049	*15*	14.69	0.055	11
4437.550	15.49	. . .	..	16.82	0.274	06	15.28	0.049	29	15.13	0.016	42	15.18	0.074	00	16.94	0.353	R
4456.502	15.18	. . .	..	16.66	0.151	60	16.49	0.214	08	16.36	0.187	*03*	14.79	0.084	*51*	16.48	0.418	*12*
" .575	16.00	. . .	..	16.66	0.224	01	16.70	0.287	06	16.82	0.260	09	16.06	0.157	*32*	16.60	0.491	*03*
4839.480	16.49	. . .	..	15.28	0.514	*12*	16.70	0.409	*03*	16.82	0.352	00	16.94	0.346	20	. . .	. . .	..
4840.523	15.85	. . .	..	16.98	0.435	15	16.82	0.278	22	16.66	0.290	*10*	16.60	0.418	40	16.31	0.206	46
4841.472	16.36	. . .	..	16.98	0.262	24	15.54	0.053	52	16.12	0.134	34	16.60	0.396	*03*	15.08	0.565	58
" .503	16.12	. . .	..	16.98	0.293	20	15.85	0.084	52	16.66	0.165	46	16.60	0.427	70	14.79	0.005	59
" .571	15.28	. . .	..	16.98	0.361	16	16.49	0.152	47	16.70	0.233	03	15.54	0.009	54	. . .	. . .	..
" .603	15.28	. . .	..	16.49	0.393	*34*	16.49	0.184	21	16.66	0.265	*07*	. . .	. . .	..	. . .	. . .	..
5160.741	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	16.60	0.087	130	16.70	0.525	18
" .779	15.44	. . .	..	16.82	0.348	00	14.74	0.570	00	16.36	0.154	26	16.31	0.125	06	14.41	0.563	*03*
" .788	15.54	. . .	..	16.82	0.357	00	14.50	0.579	*12*	16.23	0.163	04	16.41	0.134	11	14.41	0.572	09
" .800	15.70	. . .	..	16.82	0.369	00	14.46	0.004	*16*	16.23	0.175	*07*	16.31	0.146	*05*	14.15	0.584	*08*
" .809	15.49	. . .	..	16.66	0.378	*16*	14.50	0.013	*18*	16.12	0.184	*26*	16.46	0.155	08	14.10	0.002	*10*
" .822	16.00	. . .	..	16.70	0.391	*12*	14.50	0.026	*25*	16.41	0.197	*04*	16.41	0.168	00	14.15	0.015	*07*
" .830	16.23	. . .	..	16.82	0.399	00	14.41	0.034	*44*	16.66	0.205	13	16.41	0.176	*02*	14.15	0.023	*13*
" .843	16.36	. . .	..	16.70	0.412	*12*	14.69	0.047	*27*	16.60	0.218	01	16.41	0.189	*06*	14.26	0.036	*10*
" .853	16.23	. . .	..	16.82	0.422	00	14.79	0.057	*27*	16.82	0.228	19	16.41	0.199	*09*	14.41	0.046	*05*
5161.713	15.18	. . .	..	16.36	0.160	23	16.66	0.330	*02*	14.98	0.535	16	16.41	0.088	102	16.06	0.316	*25*
" .722	15.28	. . .	..	16.49	0.169	25	16.70	0.339	00	14.50	0.544	*22*	16.36	0.097	56	16.41	0.325	05
" .735	15.18	. . .	..	16.49	0.182	09	16.66	0.352	*04*	14.46	0.005	*24*	16.31	0.110	21	16.31	0.338	*09*
" .744	15.13	. . .	..	16.49	0.191	00	16.66	0.361	*05*	14.46	0.014	*25*	16.31	0.119	12	16.60	0.347	17
" .756	15.28	. . .	..	16.49	0.203	*05*	16.70	0.373	*01*	14.79	0.026	05	16.70	0.131	42	16.41	0.359	*03*
" .764	15.28	. . .	..	16.66	0.211	07	16.82	0.381	10	14.74	0.034	00	16.36	0.139	03	16.41	0.367	*09*
" .777	15.54	. . .	..	16.60	0.224	*05*	16.66	0.394	*06*	14.98	0.047	18	16.48	0.152	09	16.41	0.380	*12*
" .786	15.70	. . .	..	16.70	0.233	02	16.66	0.403	*07*	14.98	0.056	11	16.41	0.161	02	16.60	0.389	04
" .799	16.00	. . .	..	16.70	0.246	*01*	16.82	0.416	09	14.98	0.069	02	16.48	0.174	05	16.56	0.402	*02*
" .808	16.06	. . .	..	16.66	0.255	*07*	16.66	0.425	*07*	15.28	0.078	26	16.31	0.183	*15*	16.41	0.411	*18*
" .820	16.12	. . .	..	16.82	0.267	08	16.92	0.437	19	15.18	0.090	00	16.56	0.195	07	16.66	0.423	06
" .828	16.49	. . .	..	16.70	0.275	*06*	16.82	0.445	09	15.49	0.098	21	16.56	0.203	05	16.56	0.431	*04*
" .840	16.23	. . .	..	16.70	0.287	*08*	16.82	0.457	09	15.54	0.110	10	16.45	0.215	*10*	16.60	0.443	*01*
" .850	16.49	. . .	..	16.82	0.297	03	16.66	0.467	*07*	15.70	0.120	11	16.56	0.225	*01*	16.56	0.453	*05*
" .864	16.49	. . .	..	16.94	0.311	14	16.82	0.481	11	15.49	0.134	*27*	16.60	0.239	00	16.66	0.467	03
" .873	16.60	. . .	..	16.82	0.320	02	16.82	0.490	12	16.12	0.143	17	16.60	0.248	*02*	16.66	0.476	02

J. D.	No. 43. Per. 0d.54051			No. 44. Per. 0d.50640			No. 45. Per. 0d.53687			No. 46. Per. 0d.61230			No. 47. Per. 0d 54103			No. 48. Per. 0d.62780		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		d.			d.			d.			d.			d.			d.	
3372.527	16.70	0.432	07	15.18	0.503	12	16.82	0.449	07	16.70	0.187	24	16.41	0.127	30	15.18	0.027	10
3377.517	15.18	0.017	55	16.82	0.429	22	15.85	0.071	15	16.70	0.279	07	16.60	0.248	20	15.54	0.622	52
3383.513	15.08	0.067	24	16.60	0.349	08	16.82	0.161	32	16.31	0.152	00	16.70	0.292	23	16.60	0.340	00
3384.514	15.44	0.528	63	16.66	0.337	02	16.12	0.088	26	16.60	0.540	07	16.60	0.211	06	15.80	0.086	29
3664.674	....	....	..	15.66	0.458	29	14.79	0.002	04	16.60	0.267	02	15.54	0.118	R	16.41	0.247	00
3691.533	14.41	0.537	21	15.54	0.477	02	14.74	0.018	24	16.41	0.185	04	15.59	0.466	18	15.44	0.111	27
" .643	15.08	0.107	22	15.66	0.081	46	16.12	0.128	16	16.31	0.295	34	14.84	0.035	29	16.16	0.221	15
3692.540	16.16	0.463	00	15.80	0.472	26	15.85	0.488	35	15.54	0.579	21	16.41	0.391	18	16.41	0.490	04
4067.520	16.60	0.329	01	16.41	0.209	07	16.82	0.196	14	16.88	0.220	34	15.80	0.437	18	15.54	0.045	34
4071.577	15.08	0.062	27	16.31	0.215	20	15.08	0.495	57	15.44	0.603	00	16.60	0.166	20	16.60	0.336	01
4073.585	....	....	..	16.16	0.197	26	16.82	0.355	08	16.16	0.161	22	15.18	0.010	27	16.60	0.460	05
4077.492	14.79	0.032	13	14.69	0.053	08	15.13	0.504	03	16.70	0.395	00	16.12	0.130	01	15.08	0.600	13
" .581	15.80	0.121	30	15.98	0.142	02	16.00	0.056	50	16.06	0.484	62	16.82	0.219	13	15.80	0.062	R
4078.492	14.69	0.491	59	14.79	0.040	09	16.98	0.430	09	16.60	0.170	20	15.54	0.048	24	16.60	0.345	00
4079.493	16.60	0.411	06	14.84	0.029	12	16.82	0.358	08	15.54	0.559	65	14.79	0.508	07	15.80	0.090	26
" .579	14.74	0.497	36	15.49	0.115	14	16.49	0.444	40	15.69	0.033	18	15.66	0.053	31	15.98	0.176	11
4437.550	15.44	0.110	10	15.08	0.061	19	16.82	0.322	06	16.60	0.420	10	16.41	0.403	00	16.60	0.301	04
4456.502	15.44	0.144	28	16.66	0.276	00	16.82	0.484	22	16.70	0.391	00	16.41	0.419	18	16.70	0.419	10
" .575	16.16	0.217	01	16.70	0.349	02	15.28	0.020	28	16.70	0.464	01	15.54	0.492	55	16.51	0.492	07
4839.480	....	....	..	16.41	0.416	24	16.00	0.137	34	15.90	0.069	17	16.98	0.348	07	16.31	0.439	28
4840.523	....	....	..	16.06	0.446	14	15.70	0.106	39	16.94	0.500	28	17.04	0.309	10	16.31	0.227	00
4841.472	....	....	..	16.60	0.382	08	15.70	0.518	82	16.31	0.224	24	16.41	0.176	05	15.80	0.548	02
" .503	....	....	..	16.41	0.413	25	14.98	0.012	01	16.70	0.255	09	16.70	0.207	07	15.80	0.579	34
" .571	....	....	..	15.44	0.481	06	15.85	0.080	05	16.60	0.323	07	16.9	0.275	..	15.44	0.019	41
" .603	....	....	..	14.95	0.007	00	....	....	..	....	....	..	....	....	..	....	....	..
5160.741	16.16	0.099	98	15.98	0.113	31	16.82	0.349	07	16.70	0.485	02	16.88	0.237	12	16.60	0.267	13
" .779	15.44	0.137	16	15.44	0.151	R	16.98	0.387	08	16.70	0.523	08	16.94	0.275	04	16.31	0.305	24
" .788	15.54	0.146	19	16.16	0.160	04	16.82	0.396	08	16.66	0.532	08	16.88	0.284	05	16.36	0.314	21
" .800	16.16	0.158	32	16.41	0.172	09	16.82	0.408	08	16.41	0.544	09	16.94	0.296	00	16.70	0.326	12
" .809	16.06	0.167	16	16.24	0.181	14	16.82	0.417	08	16.36	0.553	01	16.94	0.305	00	16.66	0.335	06
" .822	16.06	0.180	06	16.41	0.194	01	16.98	0.430	08	16.06	0.566	06	16.70	0.318	23	16.46	0.348	12
" .830	16.12	0.188	08	16.41	0.202	02	16.82	0.438	08	15.66	0.574	15	16.94	0.326	00	16.66	0.356	06
" .843	16.16	0.201	01	16.60	0.215	09	16.70	0.451	18	16.06	0.587	38	16.94	0.339	01	16.70	0.369	10
" .853	16.31	0.211	13	16.60	0.225	06	16.94	0.461	07	16.21	0.597	R	16.94	0.349	03	16.41	0.379	19
5161.713	15.18	0.530	50	15.08	0.072	02	16.66	0.248	15	16.48	0.232	08	15.66	0.127	45	15.08	0.611	01
" .722	15.08	0.539	R	15.18	0.081	02	16.70	0.257	12	16.60	0.241	01	16.06	0.136	12	15.08	0.620	05
" .735	14.69	0.011	06	14.92	0.094	28	16.66	0.270	19	16.56	0.254	05	16.16	0.149	12	14.79	0.005	21
" .744	14.46	0.020	17	15.44	0.103	06	16.66	0.279	20	16.41	0.263	21	16.06	0.158	28	14.79	0.014	24
" .756	14.64	0.032	02	15.66	0.115	02	16.94	0.291	08	16.66	0.275	02	16.48	0.170	06	14.79	0.026	29
" .764	14.64	0.040	05	15.54	0.123	22	16.82	0.299	04	16.70	0.283	06	16.31	0.178	17	14.92	0.034	20
" .777	14.69	0.053	06	16.06	0.136	18	16.82	0.312	06	16.56	0.296	10	16.41	0.191	17	15.08	0.047	14
" .786	15.08	0.062	27	16.24	0.145	22	16.82	0.321	06	16.60	0.305	06	16.70	0.200	09	14.92	0.056	35
" .799	15.08	0.075	18	15.98	0.158	18	16.82	0.334	07	16.60	0.318	06	16.60	0.213	06	15.44	0.069	05
" .808	14.79	0.084	20	16.41	0.167	14	16.82	0.343	07	16.41	0.327	26	16.60	0.222	11	15.44	0.078	00
" .820	15.66	0.096	R	16.41	0.179	07	16.94	0.355	04	16.66	0.339	02	16.76	0.234	00	15.29	0.090	24
" .828	15.44	0.104	18	16.41	0.187	03	16.98	0.363	08	16.60	0.347	08	16.66	0.242	13	15.90	0.098	30
" .840	15.18	0.116	21	16.60	0.199	17	16.82	0.375	08	16.56	0.359	13	16.66	0.254	16	15.66	0.110	04
" .850	15.80	0.126	27	16.31	0.209	16	16.98	0.385	08	16.70	0.369	00	16.94	0.264	07	15.54	0.120	22
" .864	15.49	0.140	20	16.70	0.223	16	16.98	0.399	08	16.66	0.383	04	16.94	0.278	03	15.94	0.134	07
" .873	16.06	0.149	29	16.56	0.232	00	16.94	0.408	04	16.76	0.392	06	16.94	0.287	00	16.06	0.143	15

J. D.	No. 49.	Per. 0d.54821		No. 50.	Per. 0d.51310		No. 51.	Per. 0d.58399		No. 52.	Per. 0d.51622		No. 53.	Per. 0d.50489		No. 54.	Per. 0d.50156	
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		d.			d.			d.			d.			d.			d.	
3372.527	16.98	0.287	30	16.82	0.285	06	16.66	0.229	04	16.66	0.364	20	14.79	0.492	09	14.79	0.479	00
3377.517	16.82	0.343	10	15.70	0.144	24	16.00	0.547	22	16.49	0.192	20	16.60	0.433	02	16.66	0.453	19
3383.513	16.70	0.309	01	14.69	0.496	04	15.70	0.119	01	14.74	0.509	07	16.60	0.370	01	16.49	0.430	01
3384.514	16.66	0.213	10	16.00	0.471	50	16.49	0.536	48	16.24	0.478	26	16.66	0.362	07	16.49	0.428	01
3664.674	16.60	0.238	00	16.36	0.478	00	16.66	0.381	04	....	....	..	....	....	..	....	....	..
3691.533	16.5	0.235	..	15.70	0.143	24	16.36	0.376	34	16.49	0.346	03	16.23	0.408	35	14.46	0.492	01
" .643	16.41	0.345	31	16.66	0.253	09	16.49	0.486	03	16.49	0.456	03	14.50	0.013	10	16.00	0.101	46
3692.540	16.31	0.145	28	15.28	0.124	34	16.49	0.215	03	16.36	0.320	10	16.49	0.405	09	14.69	0.496	26
4067.520	16.31	0.150	20	14.74	0.028	02	16.66	0.273	04	14.98	0.008	48	16.60	0.252	09	16.06	0.309	42
4071.577	16.60	0.369	13	14.74	0.493	02	16.82	0.243	15	15.28	0.452	119	16.49	0.269	04	15.85	0.354	65
4073.585	16.16	0.184	30	15.08	0.449	166	15.85	0.499	60	16.49	0.395	01	16.49	0.258	03	16.49	0.356	01
4077.492	16.70	0.254	06	16.70	0.251	04	16.82	0.318	12	16.12	0.172	04	16.12	0.126	11	16.49	0.250	05
" .581	16.60	0.343	12	16.82	0.340	06	16.82	0.407	12	16.36	0.261	07	16.12	0.215	30	16.23	0.339	26
4078.492	16.60	0.158	41	16.70	0.225	01	16.41	0.150	32	16.00	0.140	13	....	....	..	16.23	0.247	20
4079.493	15.54	0.062	39	16.66	0.199	03	14.98	0.567	30	15.49	0.108	01	16.00	0.107	18	16.36	0.245	07
" .579	16.31	0.148	22	16.66	0.285	10	15.59	0.069	32	16.23	0.194	05	16.36	0.193	00	16.49	0.331	01
4437.550	16.16	0.138	28	15.70	0.113	28	15.18	0.054	05	16.66	0.425	18	16.23	0.197	13	16.49	0.188	21
4456.502	16.94	0.451	20	15.49	0.080	41	16.82	0.318	12	16.36	0.277	08	16.23	0.468	28	14.98	0.081	30
" .575	14.79	0.524	01	16.00	0.153	07	16.49	0.391	21	16.23	0.350	23	14.74	0.036	06	16.00	0.154	08
4839.480	16.60	0.230	01	16.49	0.285	27	16.49	0.199	05	16.49	0.220	12	16.49	0.235	02	16.49	0.369	01
4840.523	16.60	0.177	23	16.66	0.302	10	15.54	0.074	24	16.36	0.230	03	16.49	0.268	04	16.49	0.408	01
4841.472	15.44	0.029	52	16.82	0.225	10	16.49	0.439	20	16.12	0.147	17	16.49	0.207	11	16.49	0.354	01
" .503	15.44	0.060	31	16.70	0.256	04	16.66	0.470	06	16.00	0.178	19	16.49	0.238	02	16.60	0.385	10
" .571	15.54	0.128	20	16.82	0.324	06	15.70	0.538	29	....	....	..	16.49	0.306	08	16.49	0.453	02
" .603	....	....	..	16.66	0.356	10	14.98	0.570	20	....	....	..	....	....	..	....	....	..
5160.741	16.70	0.240	09	16.66	0.346	10	16.82	0.265	12	....	....	..	16.66	0.386	07	....	....	..
" .779	16.56	0.278	11	16.70	0.384	06	16.82	0.303	12	16.49	0.430	01	16.66	0.424	08	16.23	0.168	06
" .788	16.70	0.287	02	16.66	0.393	10	16.49	0.312	21	16.23	0.439	25	16.36	0.433	22	16.23	0.177	00
" .800	16.70	0.299	02	16.82	0.405	06	16.66	0.324	04	16.36	0.451	10	16.60	0.445	03	16.23	0.189	06
" .809	16.70	0.308	01	16.70	0.414	06	16.66	0.333	04	16.00	0.460	39	16.49	0.454	08	16.36	0.198	04
" .822	16.70	0.321	00	16.66	0.427	10	16.82	0.346	12	16.00	0.473	06	16.49	0.467	04	16.41	0.211	05
" .830	16.60	0.329	10	16.70	0.435	06	16.66	0.354	04	15.49	0.481	30	16.36	0.475	16	16.49	0.219	11
" .843	16.60	0.342	12	16.70	0.448	05	16.70	0.367	00	15.18	0.494	20	14.74	0.488	13	16.49	0.232	08
" .853	16.60	0.352	13	16.82	0.458	08	16.82	0.377	12	15.28	0.504	46	14.41	0.498	06	16.49	0.242	06
5161.713	15.54	0.116	04	16.82	0.291	06	15.28	0.069	03	16.36	0.331	10	16.70	0.348	11	15.70	0.098	22
" .722	15.54	0.125	16	16.66	0.300	10	15.28	0.078	05	16.36	0.340	10	16.49	0.357	10	15.49	0.107	11
" .735	15.98	0.138	10	16.82	0.313	06	15.85	0.091	39	16.36	0.353	10	16.60	0.370	01	15.90	0.120	14
" .744	16.06	0.147	00	16.82	0.322	06	15.70	0.100	16	16.49	0.362	02	16.49	0.379	10	15.85	0.129	00
" .756	15.90	0.159	31	16.70	0.334	06	15.85	0.112	18	16.49	0.374	02	16.36	0.391	23	16.16	0.141	18
" .764	16.41	0.167	12	16.82	0.342	06	15.70	0.120	04	16.49	0.382	02	16.66	0.399	07	16.00	0.149	02
" .777	16.24	0.180	16	16.82	0.355	06	15.85	0.133	07	16.49	0.395	02	16.60	0.412	02	16.00	0.162	12
" .786	16.06	0.189	41	16.70	0.364	06	16.00	0.142	02	16.36	0.404	12	16.49	0.421	09	16.16	0.171	02
" .799	16.41	0.202	12	16.70	0.377	06	16.23	0.155	10	16.49	0.417	01	16.66	0.434	08	16.23	0.184	03
" .808	16.48	0.211	07	16.66	0.386	10	16.12	0.164	08	16.23	0.426	25	16.60	0.443	03	16.16	0.193	15
" .820	16.60	0.223	02	16.70	0.398	06	16.49	0.176	20	16.49	0.438	01	16.66	0.455	09	16.49	0.205	15
" .828	16.48	0.231	12	16.82	0.406	06	16.36	0.184	01	16.49	0.446	02	16.60	0.463	05	16.49	0.213	13
" .840	16.56	0.243	06	16.70	0.418	06	16.36	0.196	07	16.00	0.458	43	16.16	0.475	00	16.23	0.225	16
" .850	16.41	0.253	22	16.82	0.428	06	16.23	0.206	26	16.00	0.468	19	14.98	0.485	22	16.36	0.235	05
" .864	16.60	0.267	06	16.82	0.442	07	16.36	0.220	20	15.70	0.482	00	14.41	0.499	03	16.36	0.249	08
" .873	16.60	0.276	07	16.70	0.451	04	16.60	0.229	00	15.70	0.491	23	14.22	0.003	11	16.49	0.258	05

J. D.	No. 55. Per. $0^d.53057$			No. 56. Per. $0^d.49545$			No. 57. Per. $0^d.51297$			No. 58. Per. $0^d.51671$			No. 59. Per. $0^d.58881$			No. 60. Per. $0^d.70772$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		*d.*			*d.*			*d.*			*d.*			*d.*			*d.*	
3372.527	15.70	0.147	27	16.23	0.337	*14*	16.70	0.327	*02*	16.06	0.347	*30*	16.66	0.452	*11*	15.28	0.125	R
3377.517	16.49	0.362	*22*	16.23	0.373	*05*	16.70	0.187	32	16.24	0.170	54	16.00	0.142	00	15.85	0.161	*09*
3383.513	14.79	0.522	00	15.44	0.423	*18*	15.08	0.028	34	14.79	0.482	06	16.49	0.250	*10*	16.49	0.496	*18*
3384.514	16.82	0.461	06	15.28	0.433	*21*	14.46	0.003	*18*	16.06	0.450	106	15.08	0.074	*31*	15.44	0.081	00
3664.674	16.66	0.480	*10*	15.28	0.168	*55*	15.44	0.081	20	15.18	0.036	50	16.36	0.549	06	15.28	0.692	20
3691.533	16.36	0.280	07	15.70	0.273	*53*	16.06	0.266	*60*	14.74	0.026	10	16.66	0.323	*06*	16.00	0.657	28
" .643	16.82	0.390	08	16.23	0.383	04	. . . .	. . . .	. .	15.08	0.136	*30*	16.82	0.433	05	15.44	0.060	14
3692.540	15.85	0.226	*11*	16.36	0.289	09	15.90	0.247	*72*	15.08	0.000	R	15.70	0.152	*36*	16.23	0.249	*01*
4067.520	14.98	0.093	*11*	15.70	0.214	*34*	16.70	0.246	08	16.41	0.365	13	15.49	0.060	23	15.85	0.137	05
4071.577	16.82	0.436	05	16.41	0.307	09	16.66	0.199	21	15.54	0.288	R	14.79	0.584	*08*	15.18	0.656	*53*
4073.585	16.66	0.322	11	16.49	0.333	12	16.60	0.155	47	15.90	0.230	*29*	16.66	0.237	10	16.66	0.541	*07*
4077.492	15.49	0.515	00	16.49	0.277	26	15.54	0.471	*30*	14.26	0.003	*34*	15.13	0.022	19	16.23	0.201	11
" .581	15.08	0.073	13	15.70	0.366	*63*	15.03	0.047	11	14.74	0.092	*28*	16.00	0.111	26	16.49	0.290	15
4078.492	16.94	0.454	18	16.49	0.286	23	16.70	0.445	*03*	14.41	0.486	*28*	16.82	0.434	06	16.66	0.494	*01*
4079.493	16.94	0.394	20	16.49	0.296	21	16.70	0.420	*04*	14.79	0.454	*17*	16.82	0.257	20	15.70	0.079	28
" .579	16.82	0.480	06	15.44	0.382	*75*	14.79	0.506	05	14.64	0.023	00	16.66	0.343	*07*	16.00	0.165	04
4437.550	16.49	0.316	*02*	15.70	0.142	*01*	16.94	0.424	20	15.80	0.431	R	16.66	0.317	*05*	15.28	0.030	16
4456.502	15.70	0.167	10	15.85	0.267	*35*	16.66	0.396	*08*	15.80	0.264	*52*	16.82	0.428	06	16.66	0.581	*10*
" .575	16.49	0.240	45	16.36	0.340	*02*	16.70	0.469	10	16.06	0.337	*30*	16.82	0.501	07	16.23	0.654	45
4839.480	14.98	0.074	00	15.85	0.263	*34*	. . . .	. . . .	. .	16.31	0.360	*01*	15.70	0.090	14	15.18	0.683	02
4840.523	14.98	0.056	15	16.23	0.315	*10*	16.36	0.203	*11*	16.06	0.370	*20*	15.54	0.544	R	16.49	0.310	11
4841.472	16.49	0.474	*27*	15.54	0.273	*69*	. . . .	. . . .	. .	16.41	0.285	07	16.66	0.316	*05*	16.82	0.551	08
" .503	16.36	0.505	16	16.23	0.304	*07*	16.60	0.157	46	15.90	0.316	*46*	16.66	0.347	*07*	16.82	0.582	06
" .571	14.74	0.043	00	16.66	0.372	37	16.70	0.225	14	. . . .	. . . .	. .	16.82	0.415	06	15.70	0.650	*10*
" .603	15.49	0.075	52	16.36	0.404	46	. . . .	. . . .	. .	. . . .	. . . .	. .	. . . .	. . . .	. .	14.98	0.682	*20*
5160.741	16.66	0.340	04	. . . .	. . . .	. .	16.94	0.328	22	16.51	0.228	33	16.49	0.450	*27*	. . . .	. . . .	. .
" .779	16.82	0.378	09	14.98	0.015	06	16.66	0.366	*08*	16.16	0.266	*16*	16.82	0.488	06	15.28	0.677	00
" .788	16.82	0.387	08	14.79	0.024	*17*	16.70	0.375	*04*	16.41	0.275	08	16.66	0.497	*10*	15.28	0.686	16
" .800	16.70	0.399	*05*	14.98	0.036	*03*	16.70	0.387	*04*	16.24	0.287	*11*	16.82	0.509	07	14.79	0.698	*24*
" .809	16.66	0.408	*10*	15.28	0.045	22	16.70	0.396	*04*	16.41	0.296	05	16.66	0.518	*08*	14.79	0.707	*21*
" .822	16.60	0.421	*16*	14.84	0.058	*30*	16.88	0.409	14	16.31	0.309	*05*	16.66	0.531	05	14.98	0.012	*07*
" .830	16.70	0.429	*07*	15.28	0.066	08	16.70	0.417	*04*	15.90	0.317	*46*	16.49	0.539	*01*	14.98	0.020	*10*
" .843	16.70	0.442	*07*	15.70	0.079	40	16.70	0.430	*04*	16.51	0.330	15	16.23	0.552	04	15.13	0.033	00
" .853	16.70	0.452	*07*	15.70	0.089	32	16.98	0.440	24	16.36	0.340	00	15.85	0.562	37	15.13	0.043	*08*
5161.713	16.00	0.251	*12*	15.13	0.453	*09*	16.70	0.274	02	15.54	0.166	*14*	16.49	0.244	*09*	16.00	0.195	*09*
" .722	16.00	0.260	*18*	15.18	0.462	07	16.66	0.283	*03*	15.44	0.175	*30*	16.49	0.253	*12*	16.00	0.204	*13*
" .735	16.36	0.273	10	15.13	0.475	13	16.70	0.296	00	16.21	0.188	33	16.49	0.266	*15*	16.23	0.217	08
" .744	16.23	0.282	*08*	14.79	0.484	*14*	16.70	0.305	*01*	15.66	0.197	*30*	16.66	0.275	00	16.23	0.226	05
" .756	16.49	0.294	11	14.98	0.001	08	16.70	0.317	*02*	16.16	0.209	10	16.66	0.287	*02*	16.36	0.238	15
" .764	16.36	0.302	*07*	14.79	0.009	*11*	16.94	0.325	23	16.06	0.217	*05*	16.82	0.295	13	16.06	0.246	*17*
" .777	16.49	0.315	00	15.08	0.022	14	16.66	0.338	*05*	16.06	0.230	*13*	16.66	0.308	*04*	16.36	0.259	09
" .786	16.60	0.324	03	14.98	0.031	*01*	16.60	0.347	*13*	16.48	0.239	25	16.66	0.317	*05*	16.23	0.268	*07*
" .799	16.66	0.337	05	14.98	0.044	*10*	16.88	0.360	15	16.16	0.252	*12*	16.82	0.330	10	16.36	0.281	03
" .808	16.60	0.346	*06*	15.08	0.053	*04*	16.60	0.369	*14*	16.41	0.261	10	16.66	0.339	*07*	16.23	0.290	*11*
" .820	16.60	0.358	*09*	14.98	0.065	*22*	16.70	0.381	*04*	16.41	0.273	09	16.82	0.351	09	16.16	0.302	*20*
" .828	16.82	0.366	10	15.28	0.073	00	16.70	0.389	*04*	16.60	0.281	26	16.82	0.359	09	16.23	0.310	*15*
" .840	16.70	0.378	*03*	15.28	0.085	*06*	16.70	0.401	*04*	16.60	0.293	25	16.82	0.371	08	16.36	0.322	*04*
" .850	16.66	0.388	*08*	15.70	0.095	28	16.66	0.411	*08*	16.60	0.303	24	16.82	0.381	08	16.23	0.332	*20*
" .864	16.66	0.402	*10*	15.85	0.109	35	16.88	0.425	14	16.60	0.317	24	16.82	0.395	07	16.49	0.346	04
" .873	16.70	0.411	*06*	15.85	0.118	28	16.66	0.434	*10*	16.48	0.326	12	16.66	0.404	*10*	16.66	0.355	20

J. D.	No. 61. Per. 0d.52095			No. 62. Per. 0d.65241			No. 63. Per. 0d.57042			No. 64. Per. 0d.60546			No. 65. Per. 0d.66834			No. 66. Per. 0d.62024		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		d.			d.			d.			d.			d.			d.	
3372.527	16.41	0.270	23	16.41	0.488	18	16.06	0.517	45	16.60	0.476	00	16.60	0.487	02	16.49	0.412	03
3377.517	14.57	0.051	39	16.36	0.259	14	16.41	0.374	21	15.44	0.017	R	15.54	0.130	02	16.49	0.440	03
3383.513	16.94	0.316	28	16.16	0.383	41	15.80	0.095	10	15.54	0.564	05	15.49	0.111	02	16.06	0.233	26
3384.514	16.41	0.275	24	15.49	0.080	09	15.44	0.526	R	16.56	0.354	07	16.60	0.444	05	15.28	0.614	28
3664.674	16.31	0.164	01	16.60	0.356	04	15.44	0.039	28	15.90	0.186	44	16.41	0.569	19	16.49	0.426	03
3691.533	. . .	. . .	..	16.55	0.466	04	15.44	0.088	18	16.66	0.405	02	14.69	0.026	04	14.79	0.614	21
" .643	14.46	0.044	43	16.12	0.576	R	16.66	0.198	25	16.41	0.515	02	15.85	0.136	24	15.85	0.104	15
3692.540	16.66	0.420	00	16.31	0.168	02	15.18	0.525	72	16.31	0.201	08	16.60	0.365	17	16.49	0.381	04
4067.520	16.60	0.316	06	15.54	0.012	28	16.41	0.168	14	16.70	0.401	07	16.41	0.406	08	16.00	0.116	25
4071.577	16.60	0.205	08	16.31	0.155	01	16.60	0.232	09	16.41	0.220	02	16.56	0.453	00	16.49	0.451	03
4073.585	16.06	0.130	01	16.16	0.206	28	15.44	0.529	18	16.60	0.411	03	16.60	0.456	04	15.18	0.599	03
4077.492	16.70	0.390	04	16.41	0.198	01	16.60	0.443	03	16.06	0.080	42	16.56	0.353	16	16.36	0.164	24
" .581	14.69	0.479	36	16.60	0.287	08	15.13	0.532	37	16.31	0.169	03	16.60	0.442	06	16.23	0.253	11
4078.492	16.60	0.348	06	15.44	0.546	38	16.60	0.302	01	16.22	0.475	38	14.79	0.017	21	15.28	0.544	89
4079.493	16.60	0.307	06	16.60	0.242	11	16.06	0.163	15	16.60	0.265	06	16.56	0.349	18	16.49	0.304	08
" .579	16.60	0.393	06	16.70	0.328	16	16.60	0.249	06	16.70	0.351	07	16.66	0.435	13	16.49	0.390	04
4437.550	16.36	0.471	06	15.54	0.126	R	15.08	0.566	32	16.48	0.495	05	15.54	0.176	26	16.36	0.483	07
4456.502	16.31	0.148	12	16.24	0.158	04	15.80	0.124	12	15.59	0.072	01	16.36	0.415	15	16.36	0.207	11
" .575	16.36	0.221	21	16.60	0.231	13	16.36	0.197	04	16.12	0.145	04	16.70	0.488	12	16.36	0.280	04
4839.480	16.60	0.228	02	16.41	0.171	05	16.48	0.350	14	16.41	0.400	22	16.31	0.434	22	16.23	0.497	18
4840.523	16.60	0.229	01	15.49	0.562	04	16.41	0.252	15	16.31	0.232	16	15.90	0.140	27	16.23	0.300	17
4841.472	15.54	0.136	56	15.80	0.206	64	15.54	0.060	16	15.44	0.575	06	16.36	0.421	16	15.49	0.008	45
" .503	16.31	0.167	02	16.56	0.237	08	15.85	0.092	18	15.44	0.001	R	16.41	0.452	15	15.49	0.039	27
" .571	16.94	0.235	34	16.9	0.305	..	. . .	. . .	..	15.90	0.069	42	. . .	. . .	..	16.00	0.107	30
" .603	16.5	0.267	..	16.36	0.337	18	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	16.23	0.139	29
5160.741	15.54	0.063	43	16.66	0.447	08	16.56	0.465	07	16.06	0.161	18	15.98	0.223	02	16.49	0.474	04
" .779	15.85	0.101	24	16.66	0.485	06	16.66	0.503	05	16.41	0.199	03	16.06	0.261	06	16.49	0.512	13
" .788	16.06	0.110	27	16.70	0.494	12	16.66	0.512	10	16.31	0.208	09	16.31	0.270	16	16.23	0.521	11
" .800	16.16	0.122	17	16.51	0.506	04	16.16	0.524	28	16.41	0.220	03	16.16	0.282	03	16.12	0.533	15
" .809	16.24	0.131	17	16.41	0.515	06	15.54	0.533	00	16.56	0.229	10	16.31	0.291	09	16.00	0.542	20
" .822	16.16	0.144	01	16.16	0.528	04	14.79	0.546	23	16.41	0.242	08	16.24	0.304	02	16.00	0.555	00
" .830	16.31	0.152	09	16.06	0.536	03	14.46	0.554	42	16.56	0.250	05	16.31	0.312	02	15.85	0.563	02
" .843	16.41	0.165	09	16.41	0.549	65	14.41	0.567	34	16.41	0.263	12	16.31	0.325	01	15.70	0.576	10
" .853	16.41	0.175	03	15.90	0.559	29	14.46	0.006	28	16.70	0.273	14	16.41	0.335	06	15.70	0.586	36
5161.713	15.08	0.514	31	16.16	0.114	24	16.60	0.296	00	16.31	0.528	02	16.56	0.527	04	16.23	0.205	02
" .722	15.18	0.002	R	16.24	0.123	21	16.70	0.305	10	16.24	0.537	00	16.66	0.536	06	16.23	0.214	06
" .735	15.08	0.015	31	16.16	0.136	01	16.66	0.318	06	15.90	0.550	01	16.60	0.549	00	16.23	0.227	08
" .744	14.79	0.024	00	16.24	0.145	00	16.70	0.327	10	15.54	0.559	21	16.56	0.558	04	16.36	0.236	04
" .756	15.18	0.036	34	16.36	0.157	08	16.70	0.339	10	15.80	0.571	37	16.60	0.570	00	16.49	0.248	16
" .764	15.18	0.044	29	16.16	0.165	16	16.60	0.347	01	15.54	0.579	26	16.56	0.578	04	16.23	0.256	12
" .777	15.18	0.057	16	16.36	0.178	02	16.66	0.360	04	15.18	0.592	10	16.60	0.591	02	16.36	0.269	02
" .786	15.85	0.066	R	16.41	0.187	01	16.60	0.369	02	15.18	0.601	18	16.60	0.600	04	16.23	0.278	16
" .799	15.54	0.079	22	16.36	0.200	07	16.70	0.382	08	14.79	0.008	21	16.41	0.613	02	16.36	0.291	04
" .808	15.90	0.088	45	16.41	0.209	03	16.60	0.391	02	15.54	0.017	R	16.06	0.622	00	16.36	0.300	04
" .820	16.16	0.100	57	16.70	0.221	24	16.60	0.403	02	15.18	0.029	11	15.08	0.634	12	16.49	0.312	07
" .828	15.90	0.108	17	16.41	0.229	07	16.70	0.411	08	14.95	0.037	19	14.79	0.642	00	16.49	0.320	06
" .840	16.06	0.120	14	16.56	0.241	08	16.60	0.423	03	14.84	0.049	R	14.74	0.654	13	16.49	0.332	05
" .850	16.31	0.130	27	16.36	0.251	14	16.60	0.433	03	15.54	0.059	13	14.46	0.664	07	16.49	0.342	05
" .864	15.85	0.144	32	16.60	0.265	10	16.70	0.447	07	15.54	0.073	01	14.41	0.009	12	16.36	0.356	08
" .873	16.12	0.153	12	16.41	0.274	10	16.60	0.456	03	15.44	0.082	24	14.46	0.018	12	16.36	0.365	08

J. D.	No. 67. Per. 0d.56837			No. 68. Per. 0d.51920			No. 69. Per. 0d.56660			No. 70. Per. not det'd.			No. 71. Per. 0d.54904			No. 72. Per. 0d.456075		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		d.			d.			d.			d.			d.			d.	
3372.527	16.00	0.525	05	16.16	0.476	31	16.70	0.347	03	14.79	. . . .	. .	16.06	0.126	*17*	*17.2*	0.367	. .
3377.517	16.82	0.400	12	16.66	0.274	50	. . . .	. . . .	. .	15.49	. . . .	. .	16.70	0.175	22	16.41	0.340	*49*
3383.513	16.23	0.144	09	15.90	0.040	100	15.18	0.001	18	16.60	. . . .	. .	16.36	0.131	07	16.70	0.407	*14*
3384.514	15.49	0.008	04	15.18	0.002	19	. . . .	. . . .	. .	16.06	. . . .	. .	15.18	0.034	*09*	14.46	0.040	*24*
3664.674	15.49	0.530	00	15.44	0.314	*75*	. . . .	. . . .	. .	15.18	. . . .	. .	16.12	0.184	*38*	16.70	0.170	07
3691.533	16.12	0.107	32	16.36	0.174	46	16.41	0.357	*26*	14.69	. . . .	. .	15.90	0.140	*43*	*16.5*	0.120	. .
" .643	16.36	0.217	*14*	15.54	0.284	*64*	16.8	0.467	. .	15.90	. . . .	. .	16.66	0.250	05	*16.9*	0.230	. .
3692.540	15.28	0.546	30	16.31	0.143	71	16.66	0.231	09	15.08	. . . .	. .	15.59	0.049	13	16.60	0.215	*19*
4067.520	16.66	0.402	*04*	15.44	0.260	R	16.06	0.122	48	15.54	. . . .	. .	16.06	0.034	R	17.04	0.302	16
4071.577	15.85	0.480	*82*	16.06	0.164	23	16.56	0.213	05	14.79	. . . .	. .	16.66	0.248	06	16.94	0.254	10
4073.585	16.49	0.215	*01*	14.79	0.095	*25*	14.79	0.521	*51*	14.79	. . . .	. .	15.90	0.060	28	14.57	0.438	*03*
4077.492	16.12	0.143	*02*	15.08	0.368	*113*	16.06	0.462	*46*	14.84	. . . .	. .	16.41	0.124	18	16.94	0.240	10
" .581	16.82	0.232	27	16.06	0.457	*04*	15.08	0.551	04	15.90	. . . .	. .	16.70	0.213	14	16.94	0.329	04
4078.492	15.28	0.006	75	16.24	0.329	04	16.60	0.328	*06*	15.39	. . . .	. .	16.06	0.025	R	17.04	0.328	14
4079.493	16.49	0.439	*21*	16.45	0.292	27	16.70	0.196	32	15.13	. . . .	. .	15.80	0.478	*25*	14.69	0.417	*65*
" .579	15.28	0.525	*41*	16.31	0.378	10	16.70	0.282	07	15.54	. . . .	. .	15.54	0.014	52	15.08	0.047	30
4437.550	16.82	0.423	12	16.12	0.101	94	16.60	0.162	53	15.18	. . . .	. .	15.44	0.011	R	14.69	0.455	29
4456.502	15.13	0.050	34	16.41	0.362	21	16.66	0.416	*01*	15.18	. . . .	. .	16.70	0.296	04	17.04	0.252	20
" .575	16.00	0.123	*01*	16.56	0.435	37	16.60	0.489	54	15.08	. . . .	. .	16.66	0.369	*01*	16.92	0.325	03
4839.480	15.28	0.515	*54*	16.66	0.170	81	16.98	0.373	31	15.80	. . . .	. .	16.36	0.044	R	16.41	0.127	22
4840.523	16.66	0.422	*04*	16.26	0.175	35	16.70	0.282	07	15.18	. . . .	. .	16.70	0.538	R	16.60	0.258	*25*
4841.472	16.49	0.234	*06*	15.44	0.085	46	15.85	0.098	48	15.49	. . . .	. .	16.36	0.389	*31*	16.51	0.294	*37*
" .503	16.66	0.265	03	15.44	0.116	18	16.12	0.129	47	15.44	. . . .	. .	16.70	0.420	06	16.70	0.325	*20*
" .571	16.49	0.333	*21*	15.54	0.184	*40*	. . . .	. . . .	. .	15.44	. . . .	. .	. . . .	. . . .	. .	*16.8*	0.393	. .
" .603	. . . .	. . . .	. .	15.85	0.216	*26*	. . . .	. . . .	. .	15.13	. . . .	. .	. . . .	. . . .	. .	14.36	0.425	*52*
5160.741	. . . .	. . . .	. .	14.92	0.046	02	16.66	0.371	*01*	15.54	. . . .	. .	16.70	0.117	52	16.88	0.311	*01*
" .779	15.70	0.117	*23*	14.69	0.084	*27*	16.70	0.409	03	15.54	. . . .	. .	16.48	0.155	08	16.82	0.349	*09*
" .788	16.00	0.126	00	14.69	0.093	*34*	16.70	0.418	04	15.44	. . . .	. .	16.36	0.164	*08*	16.88	0.358	*03*
" .800	16.23	0.138	14	14.74	0.105	*41*	16.70	0.430	05	15.08	. . . .	. .	16.56	0.176	09	16.94	0.370	04
" .809	16.23	0.147	08	15.08	0.114	*16*	16.70	0.439	06	15.08	. . . .	. .	16.56	0.185	07	16.94	0.379	04
" .822	16.23	0.160	00	14.92	0.127	*43*	16.60	0.452	*01*	15.08	. . . .	. .	16.56	0.198	04	16.94	0.392	05
" .830	16.36	0.168	06	15.08	0.135	*37*	16.56	0.460	03	15.08	. . . .	. .	16.46	0.206	*07*	16.76	0.400	*12*
" .843	16.49	0.181	13	15.44	0.148	*16*	15.90	0.473	*47*	15.18	. . . .	. .	16.66	0.219	09	16.51	0.413	*21*
" .853	16.23	0.191	*19*	15.80	0.158	07	15.90	0.483	*30*	15.18	. . . .	. .	16.60	0.229	02	15.08	0.423	10
5161.713	16.82	0.483	14	15.54	0.499	R	16.56	0.210	07	16.12	. . . .	. .	15.49	0.540	55	16.82	0.371	*08*
" .722	16.82	0.492	19	15.39	0.508	R	16.60	0.219	08	15.85	. . . .	. .	15.18	0.549	27	16.94	0.380	04
" .735	16.70	0.505	15	15.08	0.002	09	16.60	0.232	03	15.90	. . . .	. .	14.74	0.013	*27*	16.94	0.393	05
" .744	16.49	0.514	14	14.79	0.011	*17*	16.50	0.241	*08*	15.85	. . . .	. .	14.69	0.022	*43*	16.94	0.402	07
" .756	15.70	0.526	00	15.08	0.023	16	16.60	0.253	00	15.44	. . . .	. .	14.79	0.034	*45*	16.70	0.414	10
" .764	14.98	0.534	01	14.79	0.031	*11*	16.60	0.261	*01*	15.44	. . . .	. .	14.84	0.042	*51*	15.44	0.422	44
" .777	14.46	0.547	*14*	14.79	0.044	*11*	16.56	0.274	*06*	15.13	. . . .	. .	14.79	0.055	*72*	14.41	0.435	*20*
" .786	14.41	0.556	*12*	14.69	0.053	*20*	16.66	0.283	03	15.08	. . . .	. .	15.44	0.064	*25*	14.26	0.444	*22*
" .799	14.46	0.000	*06*	14.69	0.066	*21*	16.60	0.296	*04*	15.18	. . . .	. .	15.80	0.077	*01*	14.31	0.001	*09*
" .808	14.41	0.009	*11*	15.08	0.075	17	16.50	0.305	*15*	15.18	. . . .	. .	15.54	0.086	*39*	14.36	0.010	*07*
" .820	14.50	0.021	*02*	15.08	0.087	09	16.70	0.317	04	15.18	. . . .	. .	16.16	0.098	15	14.41	0.022	*09*
" .828	14.46	0.029	*14*	14.69	0.095	*37*	16.70	0.325	04	14.84	. . . .	. .	16.31	0.106	21	14.69	0.030	10
" .840	14.50	0.041	*20*	15.49	0.107	31	16.66	0.337	00	15.08	. . . .	. .	16.16	0.118	*02*	15.08	0.042	36
" .850	14.50	0.051	*27*	15.44	0.117	14	16.56	0.347	*11*	15.08	. . . .	. .	16.16	0.128	*08*	14.89	0.052	06
" .864	15.13	0.065	09	15.44	0.131	00	16.70	0.361	03	14.79	. . . .	. .	16.56	0.142	22	15.08	0.066	00
" .873	15.28	0.074	06	15.66	0.140	12	16.70	0.370	03	14.69	. . . .	. .	16.70	0.151	32	15.18	0.075	*02*

J. D.	No. 73. Per. not det'd.			No. 74. Per. 0d.49215			No. 75. Per. not det'd.			No. 76. Per. 0d.50175			No. 77. Per. 0d.45934			No. 78. Per. 0d.61192		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		d.			d.			d.			d.			d.			d.	
3372.527	16.60	. . .	..	16.60	0.269	18	15.18	. . .	..	14.79	0.486	21	15.54	0.107	02	16.36	0.402	16
3377.517	15.69	. . .	..	16.41	0.338	37	15.54	. . .	..	16.82	0.459	08	15.44	0.044	R	16.60	0.497	18
3383.513	15.90	. . .	..	16.94	0.428	17	15.44	. . .	..	16.82	0.434	05	15.08	0.069	04	16.60	0.373	09
3384.514	16.22	. . .	..	16.70	0.445	00	15.08	. . .	..	16.82	0.431	05	16.06	0.151	17	15.70	0.151	42
3664.674	16.41	. . .	..	15.08	0.079	40	15.18	. . .	..	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..
3691.533	16.5	. . .	..	. . .	. . .	..	16.36	. . .	..	16.49	0.379	28	16.41	0.202	27	14.36	0.598	16
" .643	16.8	. . .	..	15.18	0.472	34	15.08	. . .	..	14.92	0.489	00	14.74	0.441	09	15.13	0.096	44
3692.540	16.8	. . .	..	16.66	0.385	14	15.54	. . .	..	16.49	0.383	28	15.90	0.419	11	16.49	0.381	02
4067.520	16.41	. . .	..	16.70	0.347	08	15.54	. . .	..	15.44	0.054	67	16.41	0.119	62	16.49	0.254	04
4071.577	16.70	. . .	..	14.69	0.466	29	15.54	. . .	..	15.85	0.097	44	15.08	0.042	29	15.18	0.027	56
4073.585	16.16	. . .	..	15.08	0.014	31	15.18	. . .	..	15.85	0.098	43	16.94	0.212	21	16.49	0.200	13
4077.492	16.48	. . .	..	14.69	0.476	13	16.24	. . .	..	14.41	0.492	29	14.74	0.444	05	15.85	0.435	67
" .581	16.60	. . .	..	15.18	0.072	22	15.32	. . .	..	15.49	0.080	31	15.63	0.074	52	15.08	0.524	47
4078.492	15.94	. . .	..	14.89	0.491	13	15.85	. . .	..	14.69	0.489	10	15.80	0.066	R	16.23	0.211	16
4079.493	16.48	. . .	..	14.79	0.016	01	15.08	. . .	..	14.60	0.486	50	16.70	0.149	R	15.70	0.600	119
" .579	16.41	. . .	..	16.06	0.102	17	15.44	. . .	..	15.49	0.071	57	17.04	0.235	24	16.00	0.074	79
4437.550	15.80	. . .	..	16.94	0.280	16	15.44	. . .	..	16.82	0.294	11	16.94	0.380	16	15.80	0.072	R
4456.502	16.16	. . .	..	14.84	0.038	08	15.39	. . .	..	16.00	0.180	20	14.69	0.040	09	15.44	0.055	R
" .575	16.60	. . .	..	16.02	0.111	02	16.56	. . .	..	16.49	0.252	09	15.90	0.113	20	16.00	0.128	08
4839.480	16.31	. . .	..	16.31	0.123	13	16.31	. . .	..	. . .	. . .	..	16.60	0.387	09	15.49	0.583	87
4840.523	16.06	. . .	..	16.60	0.182	06	15.44	. . .	..	16.82	0.362	06	14.84	0.052	03	16.49	0.402	02
4841.472	16.41	. . .	..	16.56	0.147	14	15.54	. . .	..	16.82	0.307	09	15.90	0.083	67	16.49	0.127	58
" .503	15.85	. . .	..	16.70	0.178	07	15.18	. . .	..	16.82	0.338	07	15.54	0.114	16	16.49	0.158	34
" .571	15.54	. . .	..	16.98	0.246	20	15.85	. . .	..	. . .	. . .	..	. . .	. . .	..	16.23	0.226	18
" .603	15.85	. . .	..	. . .	. . .	..	15.85	. . .	..	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..
5160.741	16.21	. . .	..	15.13	0.010	37	16.60	. . .	..	16.82	0.463	12	16.60	0.110	94	14.50	0.586	10
" .779	16.06	. . .	..	15.44	0.048	36	16.36	. . .	..	14.31	0.501	05	16.31	0.148	13	14.41	0.012	09
" .788	16.41	. . .	..	14.79	0.057	39	16.41	. . .	..	14.22	0.008	05	16.56	0.157	27	14.50	0.021	06
" .800	16.16	. . .	..	15.85	0.069	49	16.41	. . .	..	14.36	0.020	01	16.41	0.169	00	14.46	0.033	21
" .809	15.98	. . .	..	15.80	0.078	32	16.41	. . .	..	14.46	0.030	01	16.56	0.178	07	14.46	0.042	31
" .822	16.12	. . .	..	15.44	0.091	24	16.26	. . .	..	14.50	0.042	10	16.60	0.191	01	14.69	0.055	27
" .830	15.80	. . .	..	15.49	0.099	31	16.24	. . .	..	14.50	0.050	22	16.41	0.199	25	14.69	0.063	40
" .843	15.94	. . .	..	16.24	0.112	23	16.36	. . .	..	14.74	0.064	20	16.70	0.212	03	14.98	0.076	24
" .853	15.90	. . .	..	16.06	0.122	12	16.12	. . .	..	14.50	0.074	60	16.41	0.222	36	15.13	0.086	26
5161.713	16.36	. . .	..	14.69	0.490	07	16.24	. . .	..	16.36	0.432	41	16.70	0.164	32	16.36	0.334	13
" .722	16.31	. . .	..	14.79	0.007	03	16.41	. . .	..	16.66	0.441	11	16.41	0.173	04	16.49	0.343	01
" .735	16.36	. . .	..	14.74	0.020	07	16.31	. . .	..	16.82	0.454	07	16.41	0.186	15	16.49	0.356	01
" .744	16.41	. . .	..	14.64	0.029	24	16.31	. . .	..	16.82	0.463	10	16.60	0.195	03	16.49	0.365	01
" .756	16.41	. . .	..	15.18	0.041	19	16.31	. . .	..	16.36	0.475	24	16.60	0.207	09	16.36	0.377	15
" .764	16.24	. . .	..	14.79	0.049	27	16.36	. . .	..	15.85	0.483	08	16.60	0.215	14	16.49	0.385	02
" .777	16.41	. . .	..	15.44	0.062	18	16.36	. . .	..	14.69	0.496	29	16.94	0.228	17	16.49	0.398	02
" .786	16.41	. . .	..	15.44	0.071	04	16.41	. . .	..	14.22	0.003	02	16.82	0.237	02	16.60	0.407	09
" .799	16.60	. . .	..	16.06	0.084	52	15.54	. . .	..	14.31	0.016	02	16.94	0.250	10	16.49	0.420	02
" .808	16.41	. . .	..	15.90	0.093	16	15.85	. . .	..	14.36	0.025	04	16.70	0.259	17	16.49	0.429	02
" .820	16.66	. . .	..	15.54	0.105	37	14.69	. . .	..	14.41	0.037	11	16.88	0.271	01	16.60	0.441	08
" .828	16.41	. . .	..	15.80	0.113	23	14.79	. . .	..	14.50	0.045	14	16.88	0.279	02	16.60	0.449	08
" .840	16.60	. . .	..	16.36	0.125	17	15.13	. . .	..	14.74	0.057	08	16.88	0.291	03	16.60	0.461	08
" .850	16.41	. . .	..	16.31	0.135	00	14.79	. . .	..	14.79	0.067	18	16.66	0.301	25	16.60	0.471	09
" .864	16.66	. . .	..	16.41	0.149	03	15.08	. . .	..	15.13	0.081	08	16.94	0.315	03	16.36	0.485	14
" .873	16.48	. . .	..	16.50	0.158	00	14.79	. . .	..	15.13	0.090	19	16.88	0.324	03	16.66	0.494	19

J. D.	No. 79. Per. 0d.48388			No. 80. Per. 0d.53934			No. 81. Per. 0d.52910			No. 82. Per. 0d.52526			No. 83. Per. 0d.501245			No. 84. Per. 0d.59573		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		d.			d.			d.			d.			d.			d.	
3372.527	16.16	0.441	75	14.79	0.047	10	16.76	0.407	03	15.18	0.512	25	14.50	0.077	23	16.41	0.260	05
3377.517	15.44	0.108	28	16.41	0.183	35	15.44	0.106	07	16.82	0.250	00	14.46	0.055	16	16.70	0.484	11
3383.513	16.41	0.298	16	16.48	0.246	03	16.70	0.282	01	16.36	0.468	17	14.69	0.36	13	16.31	0.523	00
3384.514	16.12	0.331	50	16.06	0.169	13	16.41	0.225	10	16.82	0.418	06	14.60	0.034	05	16.70	0.332	16
3664.674	16.36	0.324	25	16.70	0.411	02	15.54	0.491	06	14.84	0.089	18	15.44	0.499	85	16.70	0.499	12
3691.533	16.5	0.086	..	16.41	0.303	26	16.5	0.366	..	16.12	0.160	00	16.82	0.291	03	15.44	0.550	04
" .643	16.66	0.196	39	16.36	0.413	32	16.36	0.476	00	16.49	0.270	36	16.82	0.401	03	15.80	0.065	19
3692.540	16.41	0.125	R	16.06	0.231	37	....	....	..	15.13	0.117	06	16.82	0.296	03	16.55	0.366	04
4067.520	15.80	0.098	18	16.76	0.370	06	16.98	0.163	R	14.98	0.061	07	16.70	0.344	14	15.49	0.036	42
4071.577	16.60	0.284	06	15.44	0.112	02	14.69	0.516	07	16.82	0.441	04	16.82	0.391	02	15.18	0.519	130
4073.585	16.60	0.357	06	14.69	0.502	28	16.60	0.408	13	16.82	0.348	06	16.82	0.394	02	16.16	0.144	01
4077.492	16.60	0.393	07	15.54	0.095	30	15.13	0.82	01	15.13	0.053	25	16.94	0.292	15	16.16	0.476	44
" .581	15.13	0.482	23	16.41	0.184	33	16.41	0.171	25	16.36	0.142	68	16.98	0.381	14	15.13	0.565	05
4078.492	15.80	0.425	54	14.69	0.016	07	15.13	0.024	35	14.69	0.03	20	16.94	0.289	16	16.60	0.285	10
4079.493	14.69	0.458	43	15.08	0.478	31	14.69	0.495	23	15.44	0.478	07	16.98	0.288	20	16.06	0.094	15
" .579	15.44	0.060	20	14.79	0.024	00	15.18	0.052	30	14.98	0.039	12	16.98	0.374	14	16.41	0.180	13
4437.550	15.13	0.444	22	16.41	0.413	27	16.70	0.352	06	16.82	0.308	06	16.00	0.456	00	15.90	0.118	16
4456.502	15.08	0.041	03	15.54	0.488	37	16.70	0.256	07	17.15	0.351	27	16.82	0.360	02	14.84	0.006	01
" .575	16.06	0.114	26	14.79	0.022	02	16.8	0.329	..	16.82	0.424	05	16.82	0.433	01	15.90	0.079	11
4839.480	17.04	0.270	55	15.08	0.535	31	15.90	0.166	19	16.82	0.414	06	16.98	0.387	14	15.80	0.526	40
4840.523	16.60	0.345	04	15.44	0.499	44	16.16	0.150	25	16.82	0.407	06	16.60	0.428	22	16.41	0.377	18
4841.472	16.70	0.326	08	16.60	0.369	10	14.79	0.041	04	16.82	0.305	04	16.94	0.374	10	15.49	0.135	64
" .503	16.92	0.357	26	16.70	0.400	00	15.08	0.072	04	16.82	0.336	06	16.82	0.405	02	16.31	0.166	08
" .571	16.9	0.425	..	15.44	0.468	33	15.54	0.140	25	16.82	0.404	06	14.50	0.473	32	16.36	0.234	05
" .603	14.79	0.457	35	....	....	..	16.12	0.172	04	16.66	0.436	21	14.74	0.004	18	16.12	0.266	35
5160.741	15.54	0.234	85	16.60	0.349	10	16.60	0.263	06	....	....	..	16.82	0.350	02	16.06	0.092	16
" .779	16.16	0.272	34	16.66	0.387	04	16.66	0.301	06	....	....	..	16.70	0.388	14	16.16	0.130	04
" .788	16.06	0.281	46	16.76	0.396	07	16.76	0.310	03	16.98	0.263	15	16.82	0.397	02	16.06	0.139	09
" .800	16.41	0.293	14	16.66	0.408	03	16.76	0.322	01	17.04	0.275	19	16.60	0.409	24	16.16	0.151	03
" .809	16.56	0.302	02	16.70	0.417	02	16.88	0.331	12	16.98	0.284	12	16.66	0.418	17	16.36	0.160	14
" .822	16.41	0.315	19	16.60	0.430	08	16.70	0.344	06	16.98	0.297	11	16.82	0.431	01	16.31	0.173	05
" .830	16.31	0.323	31	16.70	0.438	02	16.76	0.352	00	....	....	..	16.82	0.439	03	16.41	0.181	12
" .843	16.56	0.336	07	16.60	0.451	03	16.60	0.365	16	16.82	0.318	05	16.36	0.452	00	16.16	0.194	17
" .853	16.79	0.346	14	16.70	0.461	18	16.70	0.375	06	16.98	0.328	10	14.98	0.462	04	16.48	0.204	12
5161.713	16.06	0.239	35	16.66	0.242	17	16.22	0.177	01	15.28	0.137	23	16.82	0.320	01	16.60	0.469	00
" .722	16.06	0.248	38	16.70	0.251	17	16.41	0.186	14	16.36	0.146	56	16.94	0.329	11	16.80	0.478	20
" .735	16.12	0.261	35	16.70	0.264	13	16.41	0.199	04	16.36	0.159	31	16.70	0.342	14	16.70	0.491	11
" .744	16.31	0.270	18	16.70	0.273	09	16.36	0.208	07	16.36	0.168	00	16.70	0.351	14	16.56	0.500	01
" .756	16.41	0.282	12	16.60	0.285	03	16.56	0.220	07	16.49	0.180	00	16.82	0.363	02	16.41	0.512	11
" .764	16.36	0.290	19	16.70	0.293	04	16.36	0.228	15	16.66	0.188	12	16.94	0.371	10	16.60	0.520	19
" .777	16.31	0.303	27	16.70	0.306	02	16.70	0.241	11	16.66	0.201	01	16.66	0.384	19	15.85	0.533	24
" .786	16.41	0.312	19	16.70	0.315	01	16.56	0.250	06	16.70	0.210	00	16.82	0.393	02	15.54	0.542	08
" .799	16.60	0.325	02	16.76	0.328	06	16.60	0.263	06	16.82	0.223	06	16.82	0.406	02	15.44	0.555	04
" .808	16.56	0.334	07	16.66	0.337	04	16.70	0.272	03	16.82	0.232	04	16.82	0.415	02	15.44	0.564	26
" .820	16.60	0.346	04	16.60	0.349	10	16.76	0.284	06	16.70	0.244	11	16.82	0.427	00	14.79	0.576	24
" .828	16.66	0.354	00	16.70	0.357	00	16.60	0.292	11	16.82	0.252	00	16.82	0.435	01	14.79	0.584	13
" .840	16.66	0.366	01	16.85	0.369	15	16.76	0.304	03	16.98	0.264	14	16.66	0.447	00	14.79	0.000	04
" .850	16.66	0.376	02	16.66	0.379	04	16.88	0.314	14	16.94	0.274	10	15.28	0.457	00	14.74	0.010	10
" .864	16.70	0.390	02	16.76	0.393	06	16.94	0.328	18	17.04	0.288	18	14.50	0.471	30	15.08	0.024	16
" .873	16.88	0.399	22	16.76	0.402	06	16.76	0.337	00	16.98	0.297	11	14.41	0.480	29	14.79	0.033	23

J. D.	No. 85.	Per. not det'd.		No. 86.	Per. 0d.41420		No. 87.	Per. not det'd.		No. 88.	Per. 0d.65418		No. 89.	Per. 0d.54848		No. 90.	Per. 0d.51703	
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		d.			d.			d.			d.			d.			d.	
3372.527	16.16	. . . .	..	15.32	0.027	24	16.24	. . . .	..	15.49	0.527	58	16.49	0.299	02	16.66	0.392	01
3377.517	15.90	. . . .	..	15.44	0.047	31	16.41	. . . .	..	15.70	0.284	29	16.66	0.353	08	16.66	0.211	12
3383.513	15.44	. . . .	..	16.60	0.244	04	15.90	. . . .	..	16.24	0.392	20	16.66	0.316	12	14.64	0.003	00
3384.514	15.13	. . . .	..	15.18	0.002	12	15.13	. . . .	..	15.70	0.085	41	16.49	0.220	20	15.13	0.487	03
3664.674	16.36	. . . .	..	15.80	0.163	03	15.54	. . . .	..	16.23	0.256	27	15.49	0.106	08	16.66	0.417	00
3691.533	15.08	. . . .	..	15.44	0.099	11	15.44	. . . .	..	15.28	0.293	72	15.28	0.090	14	16.66	0.390	01
" .643	15.08	. . . .	..	16.70	0.209	32	15.23	. . . .	..	15.49	0.403	55	16.00	0.200	19	14.84	0.500	16
3692.540	16.41	. . . .	..	16.79	0.278	22	15.85	. . . .	..	15.28	0.646	54	14.60	0.000	13	16.66	0.363	01
4067.520	16.21	. . . .	..	15.44	0.407	38	15.44	. . . .	..	14.95	0.127	59	16.36	0.368	24	14.50	0.496	21
4071.577	15.13	. . . .	..	16.41	0.322	17	15.08	. . . .	..	16.00	0.259	03	14.99	0.037	18	16.49	0.417	17
4073.585	15.90	. . . .	..	16.60	0.259	03	15.08	. . . .	..	16.00	0.304	00	16.49	0.400	13	16.70	0.357	03
4077.492	16.06	. . . .	..	15.08	0.024	00	15.54	. . . .	..	15.70	0.286	29	15.28	0.468	136	16.12	0.128	13
" .581	15.13	. . . .	..	15.80	0.113	41	15.54	. . . .	..	15.32	0.375	71	14.69	0.008	18	16.66	0.217	11
4078.492	16.16	. . . .	..	16.24	0.195	00	16.12	. . . .	..	15.28	0.632	41	16.49	0.371	11	15.94	0.092	27
4079.493	15.44	. . . .	..	15.90	0.368	30	15.49	. . . .	..	15.28	0.324	74	16.36	0.275	10	15.44	0.061	10
" .579	16.16	. . . .	..	15.08	0.040	03	15.85	. . . .	..	16.00	0.410	04	16.23	0.361	36	16.23	0.147	10
4437.550	15.85	. . . .	..	15.13	0.142	45	15.08	. . . .	..	16.23	0.545	16	15.85	0.174	21	16.49	0.333	18
4456.502	15.90	. . . .	..	15.54	0.041	43	15.29	. . . .	..	14.69	0.526	138	16.49	0.478	13	16.23	0.155	03
" .575	15.18	. . . .	..	15.18	0.114	21	15.44	. . . .	..	15.49	0.599	02	14.60	0.002	12	16.49	0.228	10
4839.480	15.44	. . . .	..	16.70	0.298	12	15.44	. . . .	..	16.23	0.154	51	15.70	0.068	49	14.79	0.014	06
4840.523	15.18	. . . .	..	15.44	0.098	13	15.18	. . . .	..	16.23	0.543	17	15.08	0.014	54	14.95	0.022	07
4841.472	15.54	. . . .	..	15.49	0.219	97	15.49	. . . .	..	16.23	0.184	41	16.66	0.415	03	16.66	0.452	12
" .503	15.44	. . . .	..	16.31	0.250	25	15.18	. . . .	..	16.00	0.215	11	16.66	0.446	00	15.28	0.483	06
" .571	15.44	. . . .	..	16.92	0.318	33	15.44	. . . .	..	15.49	0.283	50	14.98	0.514	00	14.84	0.034	17
" .603	. . . .	. . . .	..	16.2	0.350	..	. . . .	. . . .	..	15.28	0.315	R	14.69	0.546	21	15.28	0.066	10
5160.741	15.44	. . . .	..	15.44	0.140	13	15.54	. . . .	..	16.23	0.213	34	16.82	0.469	18	16.66	0.199	17
" .779	14.79	. . . .	..	16.24	0.178	27	14.74	. . . .	..	16.12	0.251	16	15.28	0.507	00	16.82	0.237	20
" .788	14.79	. . . .	..	16.41	0.187	28	14.79	. . . .	..	16,00	0.260	03	14.98	0.516	02	16.82	0.246	18
" .800	15.18	. . . .	..	16.31	0.199	05	14.69	. . . .	..	16.23	0.272	25	14.46	0.528	21	16.66	0.258	00
" .809	14.74	. . . .	..	16.48	0.208	12	15.08	. . . .	..	15.85	0.281	14	14.36	0.537	20	16.66	0.267	00
" .822	15.18	. . . .	..	16.31	0.221	16	15.13	. . . .	..	16.12	0.294	13	14.26	0.001	21	16.82	0.280	16
" .830	15.18	. . . .	..	16.60	0.229	09	15.18	. . . .	..	16.00	0.302	00	14.46	0.009	04	16.70	0.288	03
" .843	16.06	. . . .	..	16.51	0.242	04	15.44	. . . .	..	16.12	0.315	11	14.46	0.022	23	16.66	0.301	02
" .853	15.85	. . . .	..	16.51	0.252	05	15.44	. . . .	..	16.12	0.325	11	14.46	0.032	32	16.82	0.311	15
5161.713	16.16	. . . .	..	16.56	0.283	02	15.90	. . . .	..	16.12	0.531	06	16.41	0.344	17	15.85	0.137	21
" .722	15.49	. . . .	..	16.60	0.292	03	15.98	. . . .	..	16.00	0.540	07	16.60	0.353	02	15.85	0.146	27
" .735	15.44	. . . .	..	16.66	0.305	08	16.06	. . . .	..	16.00	0.553	04	16.49	0.366	11	16.12	0.159	11
" .744	15.29	. . . .	..	16.66	0.314	08	15.90	. . . .	..	16.00	0.562	02	16.49	0.375	11	16.23	0.168	05
" .756	15.18	. . . .	..	16.56	0.326	02	15.80	. . . .	..	16.00	0.574	02	16.49	0.387	12	16.36	0.180	01
" .764	15.08	. . . .	..	16.60	0.334	04	15.85	. . . .	..	16.00	0.582	08	16.49	0.395	12	16.36	0.188	09
" .777	15.18	. . . .	..	16.60	0.347	03	15.49	. . . .	..	15.70	0.595	03	16.23	0.408	39	16.49	0.201	01
" .786	14.79	. . . .	..	16.60	0.356	04	15.90	. . . .	..	15.13	0.604	10	16.60	0.417	03	16.49	0.210	04
" .799	14.84	. . . .	..	16.41	0.369	30	15.13	. . . .	..	14.92	0.617	17	16.70	0.430	06	16.66	0.223	07
" .808	14.79	. . . .	..	16.16	0.378	48	15.44	. . . .	..	14.92	0.626	00	16.60	0.439	04	16.49	0.232	13
" .820	14.79	. . . .	..	15.28	0.390	08	15.18	. . . .	..	14.79	0.638	03	16.70	0.451	05	16.66	0.244	02
" .828	14.79	. . . .	..	15.54	0.398	43	14.79	. . . .	..	14.69	0.646	04	16.60	0.459	05	16.70	0.252	04
" .840	14.79	. . . .	..	15.29	0.410	24	15.54	. . . .	..	14.79	0.004	11	16.70	0.471	07	16.66	0.264	00
" .850	14.79	. . . .	..	15.08	0.006	02	15.18	. . . .	..	14.60	0.014	10	16.60	0.481	00	16.66	0.274	00
" .864	14.79	. . . .	..	14.79	0.020	29	15.54	. . . .	..	14.95	0.028	17	16.36	0.495	00	16.70	0.288	00
" .873	14.92	. . . .	..	15.29	0.029	20	15.75	. . . .	..	14.98	0.037	11	15.70	0.504	00	16.66	0.297	01

J. D.	No. 91. Per. 0d.53018			No. 92. Per. 0d.50355			No. 93. Per. 0d.60232			No. 94. Per. 0d.52370			No. 95. Per. not det'd.			No. 96. Per. 0d.49947		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		d.			d.			d.			d.			d.			d.	
3372.527	16.49	0.161	30	15.49	0.077	27	16.66	0.447	04	14.50	0.017	23	13.35	. . .	..	16.51	0.258	00
3377.517	16.70	0.379	04	14.79	0.032	09	14.95	0.016	09	16.66	0.294	23	13.40	. . .	..	16.60	0.254	09
3383.513	14.98	0.013	11	15.08	0.488	07	14.95	0.591	10	14.79	0.005	13	13.35	. . .	..	16.49	0.256	02
3384.514	16.66	0.484	06	15.13	0.482	17	16.66	0.388	04	16.23	0.483	86	13.50	. . .	..	16.60	0.258	08
3664.674	16.00	0.173	25	16.49	0.165	11	16.66	0.469	08	16.82	0.463	52	13.40	. . .	..	16.23	0.215	06
3691.533	16.49	0.523	156	16.82	0.336	01	16.1	0.223	..	15.49	0.090	41	13.40	. . .	..	14.92	0.103	41
" .643	14.69	0.103	111	16.82	0.446	01	16.1	0.333	..	16.49	0.200	25	13.40	. . .	..	16.36	0.213	07
3692.540	16.82	0.469	08	16.82	0.336	01	15.49	0.026	43	14.79	0.049	36	13.50	. . .	..	15.35	0.111	07
4067.520	16.23	0.075	R	16.70	0.171	29	16.66	0.363	04	16.00	0.060	67	13.45	. . .	..	14.53	0.489	15
4071.577	16.82	0.421	05	16.82	0.200	20	16.66	0.203	01	15.28	0.451	140	13.35	. . .	..	14.92	0.050	11
4073.585	16.82	0.308	15	16.94	0.193	37	16.49	0.405	21	16.82	0.364	08	13.40	. . .	..	14.99	0.060	07
4077.492	14.98	0.503	160	15.70	0.072	50	15.70	0.095	00	16.23	0.082	50	13.35	. . .	..	14.53	0.471	08
" .581	15.54	0.062	27	16.66	0.161	36	16.70	0.184	06	16.82	0.171	19	13.40	. . .	..	15.08	0.061	17
4078.492	16.49	0.443	28	15.70	0.065	59	15.49	0.493	00	15.28	0.034	35	13.35	. . .	..	14.57	0.472	00
4079.493	16.70	0.384	06	15.70	0.059	64	16.70	0.289	00	14.79	0.512	07	13.50	. . .	..	14.60	0.474	08
" .579	15.70	0.470	105	16.49	0.145	39	16.66	0.375	04	16.00	0.074	40	13.35	. . .	..	15.18	0.061	26
4437.550	14.79	0.032	16	15.08	0.092	30	15.32	0.568	25	16.94	0.358	04	14.00	. . .	..	16.82	0.411	10
4456.502	16.82	0.428	05	16.82	0.412	00	16.82	0.246	13	16.82	0.457	32	13.90	. . .	..	16.82	0.383	11
" .575	16.49	0.501	07	15.70	0.485	42	. . . .	. . . .	..	14.79	0.006	12	14.10	. . .	..	16.31	0.456	00
4839.480	15.44	0.078	00	16.49	0.189	04	16.49	0.148	02	15.70	0.086	11	13.40	. . .	..	16.49	0.268	06
4840.523	15.13	0.061	36	16.70	0.225	05	15.49	0.589	45	15.70	0.082	04	13.50	. . .	..	16.79	0.312	16
4841.472	16.49	0.480	24	16.00	0.167	37	16.49	0.334	21	14.79	0.508	00	13.40	. . .	..	16.51	0.262	02
" .503	16.00	0.511	15	16.36	0.198	23	16.60	0.365	10	15.08	0.015	35	13.35	. . .	..	16.66	0.293	05
" .571	15.13	0.048	05	16.49	0.266	33	16.66	0.433	04	15.70	0.083	06	13.35	. . .	..	16.49	0.361	21
" .603	15.54	0.080	06	16.82	0.298	00	16.00	0.465	68	. . .	. . .	..	13.30	. . .	..	16.23	0.393	48
5160.741	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	16.23	0.370	R
" .779	16.12	0.082	45	16.82	0.223	08	16.82	0.373	12	16.98	0.357	08	13.50	. . .	..	16.82	0.408	10
" .788	16.00	0.091	33	16.66	0.232	11	16.82	0.411	12	16.94	0.366	04	13.40	. . .	..	16.66	0.417	06
" .800	16.16	0.103	36	16.82	0.244	02	16.66	0.432	04	16.82	0.378	08	13.40	. . .	..	16.82	0.429	09
" .809	16.16	0.112	28	16.82	0.253	01	16.70	0.441	00	16.94	0.387	04	13.40	. . .	..	16.82	0.438	09
" .822	16.12	0.125	15	16.94	0.266	12	16.82	0.454	12	16.70	0.400	20	13.40	. . .	..	16.82	0.451	11
" .830	16.49	0.133	47	16.70	0.274	13	16.66	0.462	03	16.82	0.408	08	13.60	. . .	..	16.12	0.459	00
" .843	16.49	0.146	38	16.98	0.287	15	16.23	0.475	00	16.82	0.421	08	13.40	. . .	..	14.41	0.472	20
" .853	16.36	0.156	22	16.98	0.297	15	15.70	0.485	00	16.94	0.431	05	13.40	. . .	..	14.41	0.482	02
5161.713	16.12	0.486	60	16.00	0.150	20	16.36	0.140	10	16.82	0.244	04	13.50	. . .	..	16.70	0.343	02
" .722	16.00	0.495	65	16.49	0.159	21	16.66	0.149	14	16.98	0.253	11	13.50	. . .	..	16.70	0.352	01
" .735	15.85	0.508	55	16.36	0.172	05	16.82	0.162	21	16.82	0.266	06	13.50	. . .	..	16.60	0.365	10
" .744	15.13	0.517	13	16.49	0.181	01	16.49	0.171	14	16.94	0.275	05	13.50	. . .	..	16.70	0.374	00
" .756	14.98	0.529	09	16.49	0.193	09	16.60	0.183	04	16.82	0.287	07	13.50	. . .	..	16.51	0.386	19
" .764	14.79	0.007	07	16.82	0.201	19	16.66	0.191	00	16.98	0.295	08	13.50	. . .	..	16.60	0.394	11
" .777	14.79	0.020	10	16.70	0.214	00	16.66	0.204	00	16.82	0.308	08	13.40	. . .	..	16.66	0.407	06
" .786	14.95	0.029	02	16.60	0.223	15	16.66	0.213	01	16.82	0.317	08	13.50	. . .	..	16.66	0.416	06
" .799	15.28	0.042	28	16.82	0.236	04	16.82	0.226	14	16.94	0.330	04	13.50	. . .	..	16.70	0.429	03
" .808	14.98	0.051	11	16.70	0.245	10	16.49	0.235	19	16.82	0.339	08	13.50	. . .	..	16.70	0.438	03
" .820	14.98	0.063	30	16.94	0.257	13	16.66	0.247	03	16.82	0.351	08	. . .	. . .	..	16.70	0.450	00
" .828	15.13	0.071	25	16.98	0.265	16	16.82	0.255	13	16.82	0.359	08	13.50	. . .	..	16.36	0.458	16
" .840	15.70	0.083	08	16.82	0.277	00	16.66	0.267	03	16.82	0.371	08	13.50	. . .	..	14.92	0.470	14
" .850	16.00	0.093	32	16.82	0.287	00	16.70	0.277	00	16.82	0.381	08	13.50	. . .	..	14.36	0.480	10
" .864	16.12	0.107	28	16.82	0.301	01	16.82	0.291	12	16.94	0.395	04	13.50	. . .	..	14.20	0.494	15
" .873	16.23	0.116	35	16.98	0.310	15	16.82	0.300	12	16.98	0.404	08	13.50	. . .	..	14.20	0.003	16

J. D.	No. 97. Per. 0d.50428			No. 98. Per. not det'd.			No. 99. Per. not det'd.			No. 100. Per. 0d.55819			No. 101. Per. 0d.64387			No. 102. Per. not det'd.		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d		d.			d.			d.			d.			d.			d.	
3372.527	16.12	0.397	*18*	15.39	. . .	..	16.31	. . .	..	16.70	0.445	25	16.66	0.377	19	16.41	. . .	..
3377.517	16.36	0.344	*02*	15.66	. . .	..	16.48	. . .	..	16.60	0.411	*03*	16.66	0.216	42	16.60	. . .	..
3383.513	16.23	0.289	*01*	15.54	. . .	..	15.08	. . .	..	16.70	0.267	06	16.49	0.417	02	16.60	. . .	..
3384.514	16.12	0.281	*09*	15.80	. . .	..	15.18	. . .	..	16.12	0.152	*19*	16.00	0.130	06	16.56	. . .	..
3664.674	15.49	0.061	01	15.44	. . .	..	15.44	. . .	..	15.54	0.101	*46*	. . .	. . .	..	. . .	. . .	..
3691.533	15.85	0.193	*02*	15.08	. . .	..	16.31	. . .	..	16.41	0.167	03	15.49	0.023	17	16.41	. . .	..
" .643	. . .	. . .	..	15.08	. . .	..	16.31	. . .	..	16.36	0.277	*29*	16.23	0.133	27	16.41	. . .	..
3692.540	15.70	0.192	*18*	15.44	. . .	..	16.31	. . .	..	15.80	0.057	01	16.36	0.387	*11*	16.41	. . .	..
4067.520	16.12	0.492	67	15.29	. . .	..	15.90	. . .	..	15.54	0.492	*34*	15.49	0.634	29	16.48	. . .	..
4071.577	15.35	0.010	*01*	15.18	. . .	..	16.36	. . .	..	16.06	0.083	15	16.23	0.184	09	16.41	. . .	..
4073.585	15.49	0.001	14	15.44	. . .	..	15.85	. . .	..	16.66	0.417	05	16.49	0.261	13	16.60	. . .	..
4077.492	16.49	0.378	10	15.44	. . .	..	15.44	. . .	..	15.44	0.416	*118*	16.49	0.304	07	16.70	. . .	..
" .581	15.54	0.467	*12*	15.44	. . .	..	15.54	. . .	..	16.70	0.505	R	16.49	0.393	01	16.41	. . .	..
4078.492	16.49	0.370	09	15.80	. . .	..	16.16	. . .	..	16.88	0.300	20	15.70	0.017	42	16.48	. . .	..
4079.493	16.66	0.362	26	15.54	. . .	..	16.24	. . .	..	16.16	0.184	*31*	16.66	0.374	19	16.48	. . .	..
" .579	15.85	0.448	02	15.54	. . .	..	15.32	. . .	..	16.60	0.270	*06*	16.49	0.460	02	16.41	. . .	..
4437.550	16.41	0.380	02	15.54	. . .	..	16.51	. . .	..	15.90	0.442	*57*	16.49	0.439	01	16.41	. . .	..
4456.502	15.70	0.170	*10*	15.44	. . .	..	15.54	. . .	..	16.70	0.415	09	15.54	0.075	*10*	16.41	. . .	..
" .575	16.23	0.243	16	15.44	. . .	..	15.90	. . .	..	16.70	0.488	76	15.85	0.148	*17*	16.16	. . .	..
4839.480	16.49	0.399	19	15.54	. . .	..	15.44	. . .	..	16.60	0.475	52	. . .	. . .	..	16.41	. . .	..
4840.523	15.70	0.434	*28*	15.54	. . .	..	15.44	. . .	..	16.06	0.401	*61*	16.49	0.349	01	16.48	. . .	..
4841.472	16.23	0.374	*17*	15.54	. . .	..	16.31	. . .	..	16.66	0.234	07	16.00	0.011	73	16.70	. . .	..
" .503	16.49	0.405	26	15.44	. . .	..	16.36	. . .	..	16.60	0.265	*04*	. . .	. . .	..	16.60	. . .	..
" .571	. . .	. . .	..	15.44	. . .	..	16.24	. . .	..	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..
" .603	15.44	0.001	08	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..
5160.741	. . .	. . .	..	16.60	. . .	..	15.54	. . .	..	16.94	0.218	37	. . .	. . .	..	16.70	. . .	..
" .779	15.70	0.472	10	15.54	. . .	..	16.31	. . .	..	16.60	0.256	*03*	15.70	0.602	39	16.60	. . .	..
" .788	15.49	0.481	*04*	15.49	. . .	..	16.21	. . .	..	16.70	0.265	06	15.28	0.611	02	16.60	. . .	..
" .800	15.28	0.493	*16*	15.44	. . .	..	16.31	. . .	..	16.60	0.277	*06*	15.28	0.623	04	16.41	. . .	..
" .809	15.13	0.502	*25*	15.54	. . .	..	16.31	. . .	..	16.66	0.286	00	14.98	0.632	*23*	16.50	. . .	..
" .822	15.35	0.011	*02*	15.18	. . .	..	16.31	. . .	..	16.60	0.299	*08*	14.98	0.001	*23*	16.60	. . .	..
" .830	15.18	0.019	*20*	15.18	. . .	..	16.41	. . .	..	16.66	0.307	*03*	15.13	0.009	*10*	16.50	. . .	..
" .843	15.70	0.032	29	15.54	. . .	..	16.51	. . .	..	16.60	0.320	*10*	15.28	0.022	*03*	16.70	. . .	..
" .853	15.49	0.042	06	15.18	. . .	..	16.79	. . .	..	16.94	0.330	24	15.70	0.032	32	16.56	. . .	..
5161.713	16.12	0.397	*18*	15.54	. . .	..	15.94	. . .	..	16.16	0.074	30	16.23	0.248	*09*	16.60	. . .	..
" .722	16.00	0.406	*22*	15.54	. . .	..	15.54	. . .	..	16.06	0.083	15	16.23	0.257	*11*	16.46	. . .	..
" .735	16.12	0.419	00	15.90	. . .	..	16.06	. . .	..	16.22	0.096	25	16.36	0.270	*01*	16.60	. . .	..
" .744	16.00	0.428	*01*	15.18	. . .	..	15.80	. . .	..	15.98	0.105	*05*	16.36	0.279	*03*	16.41	. . .	..
" .756	16.00	0.440	09	15.80	. . .	..	16.21	. . .	..	16.16	0.117	08	16.23	0.291	*17*	16.66	. . .	..
" .764	15.70	0.448	*14*	15.54	. . .	..	15.54	. . .	..	16.16	0.125	03	16.12	0.299	*29*	16.56	. . .	..
" .777	15.70	0.461	*02*	15.44	. . .	..	15.66	. . .	..	16.31	0.138	09	16.49	0.312	06	16.50	. . .	..
" .786	15.70	0.470	07	15.18	. . .	..	15.54	. . .	..	16.31	0.147	03	16.36	0.321	*07*	16.41	. . .	..
" .799	15.70	0.483	18	15.54	. . .	..	15.85	. . .	..	16.41	0.160	05	16.49	0.334	03	16.56	. . .	..
" .808	15.49	0.492	02	15.13	. . .	..	15.54	. . .	..	16.31	0.169	*08*	16.36	0.343	*10*	16.41	. . .	..
" .820	15.35	0.000	00	15.44	. . .	..	15.54	. . .	..	16.60	0.181	16	16.60	0.355	12	16.60	. . .	..
" .828	15.49	0.008	13	15.44	. . .	..	15.44	. . .	..	16.41	0.189	*05*	16.49	0.363	01	16.41	. . .	..
" .840	15.49	0.020	11	15.18	. . .	..	15.54	. . .	..	16.56	0.201	04	16.23	0.375	*25*	16.48	. . .	..
" .850	15.49	0.030	09	15.54	. . .	..	15.85	. . .	..	16.60	0.211	04	16.49	0.385	01	16.60	. . .	..
" .864	15.70	0.044	27	15.18	. . .	..	15.80	. . .	..	16.56	0.225	*02*	16.23	0.399	*25*	16.41	. . .	..
" .873	15.70	0.053	24	15.44	. . .	..	16.24	. . .	..	16.60	0.234	00	16.12	0.408	*36*	16.56	. . .	..

J. D.	No. 103. Per. not det'd.			No. 104. Per. 0d.57084			No. 105. Per. not det'd.			No. 106. Per. 0d.54718			No. 107. Per. 0d.44725			No. 108. Per. 0d.519607		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		d.			d.			d.			d.			d.			d.	
3372.527	17.04	. . .	..	14.69	0.037	13	15.13	. . .	..	16.70	0.417	91	16.16	0.247	16	16.00	0.157	02
3377.517	17.25	. . .	..	16.36	0.460	34	15.49	. . .	..	16.66	0.482	01	16.36	0.317	02	16.66	0.471	03
3383.513	17.39	. . .	..	16.12	0.177	10	15.28	. . .	..	16.70	0.459	00	15.44	0.052	16	16.49	0.231	09
3384.514	17.02	. . .	..	14.60	0.036	22	16.12	. . .	..	16.49	0.366	17	15.54	0.158	46	16.36	0.193	05
3664.674	. . .	. . .	..	. . .	. . .	..	15.28	. . .	..	16.66	0.370	00	16.12	0.340	26	16.49	0.285	21
3691.533	16.5	. . .	..	16.00	0.514	00	16.12	. . .	..	16.49	0.417	19	16.49	0.364	22	15.70	0.124	10
" .643	17.2	. . .	..	14.36	0.053	65	15.18	. . .	..	16.00	0.527	107	14.98	0.026	10	16.66	0.234	08
3692.540	17.39	. . .	..	. . .	. . .	..	14.98	. . .	..	16.49	0.330	13	15.28	0.029	18	15.13	0.092	18
4067.520	17.04	. . .	..	16.49	0.318	15	15.28	. . .	..	15.85	0.491	77	16.23	0.214	02	16.00	0.435	73
4071.577	17.04	. . .	..	16.49	0.379	21	16.12	. . .	..	16.36	0.171	05	16.49	0.245	17	16.82	0.336	09
4073.585	17.04	. . .	..	16.00	0.103	44	15.70	. . .	..	15.13	0.537	25	15.08	0.017	04	16.82	0.265	14
4077.492	17.04	. . .	..	14.74	0.015	08	14.98	. . .	..	15.28	0.067	08	16.23	0.346	14	14.98	0.015	18
" .581	17.04	. . .	..	15.18	0.104	38	15.49	. . .	..	16.23	0.156	04	15.13	0.435	22	16.12	0.104	72
4078.492	16.98	. . .	..	16.82	0.444	11	16.00	. . .	..	14.79	0.520	21	15.28	0.004	31	14.69	0.496	16
4079.493	17.34	. . .	..	16.82	0.303	19	15.28	. . .	..	16.70	0.426	00	15.28	0.111	44	15.18	0.457	154
" .579	17.04	. . .	..	16.82	0.389	12	15.28	. . .	..	14.98	0.512	39	16.23	0.197	06	15.08	0.024	25
4437.550	17.29	. . .	..	16.36	0.443	34	15.44	. . .	..	15.49	0.081	01	16.36	0.368	16	15.13	0.505	41
4456.502	17.44	. . .	..	14.50	0.558	10	15.13	. . .	..	16.82	0.428	12	15.28	0.088	25	16.82	0.232	22
" .575	17.12	. . .	..	15.28	0.060	23	15.49	. . .	..	16.36	0.501	08	15.70	0.161	32	16.82	0.305	10
4839.480	17.39	. . .	..	. . .	. . .	..	15.44	. . .	..	16.66	0.380	00	15.85	0.220	39	16.82	0.259	15
4840.523	17.29	. . .	..	. . .	. . .	..	16.12	. . .	..	16.66	0.329	05	16.16	0.368	04	16.82	0.263	14
4841.472	17.29	. . .	..	. . .	. . .	..	15.13	. . .	..	16.49	0.184	11	16.00	0.423	106	15.85	0.173	31
" .503	16.98	. . .	..	. . .	. . .	..	14.98	. . .	..	16.66	0.215	17	15.54	0.007	56	16.66	0.204	26
" .571	. . .	. . .	..	. . .	. . .	..	15.49	. . .	..	16.66	0.283	08	15.28	0.075	17	16.82	0.272	13
" .603	. . .	. . .	..	. . .	. . .	..	15.49	. . .	..	. . .	. . .	..	. . .	. . .	..	16.82	0.304	10
5160.741	17.39	. . .	..	16.70	0.380	00	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..
" .779	17.08	. . .	..	16.60	0.418	10	16.16	. . .	..	16.36	0.485	31	15.13	0.394	07	16.66	0.441	07
" .788	17.34	. . .	..	16.70	0.427	00	16.16	. . .	..	16.06	0.494	54	15.13	0.402	05	16.82	0.450	09
" .800	17.14	. . .	..	16.66	0.439	04	16.16	. . .	..	15.28	0.506	32	14.98	0.414	02	16.66	0.462	06
" .809	17.14	. . .	..	16.60	0.448	10	16.12	. . .	..	15.44	0.515	34	14.98	0.424	04	16.70	0.471	01
" .822	17.29	. . .	..	16.70	0.461	00	15.28	. . .	..	14.98	0.528	06	14.79	0.436	12	16.49	0.484	00
" .830	17.04	. . .	..	16.70	0.469	02	15.28	. . .	..	14.98	0.536	10	14.98	0.444	08	15.18	0.492	00
" .843	17.35	. . .	..	16.60	0.482	01	15.28	. . .	..	14.79	0.002	07	15.13	0.10	13	14.50	0.505	22
" .853	17.04	. . .	..	16.49	0.492	03	15.28	. . .	..	14.79	0.012	09	15.28	0.020	23	14.31	0.515	41
5161.713	17.14	. . .	..	16.49	0.210	10	15.28	. . .	..	16.36	0.324	24	15.13	0.433	22	16.70	0.336	04
" .722	17.34	. . .	..	16.49	0.219	07	15.28	. . .	..	16.51	0.333	10	14.98	0.442	08	16.82	0.345	08
" .735	17.08	. . .	..	16.49	0.232	01	14.79	. . .	..	16.49	0.346	14	14.74	0.008	25	16.66	0.358	08
" .744	17.08	. . .	..	16.49	0.241	01	14.50	. . .	..	16.49	0.355	15	15.08	0.017	05	16.66	0.367	08
" .756	17.29	. . .	..	16.49	0.253	04	14.98	. . .	..	16.66	0.367	00	14.98	0.029	11	16.66	0.379	08
" .764	17.34	. . .	..	16.49	0.261	07	14.98	. . .	..	16.49	0.375	18	14.74	0.037	42	16.70	0.387	04
" .777	17.08	. . .	..	16.66	0.274	08	14.74	. . .	..	16.70	0.388	03	15.28	0.050	01	16.82	0.400	08
" .786	17.08	. . .	..	16.60	0.283	00	14.98	. . .	..	16.66	0.397	01	15.49	0.059	19	16.82	0.409	08
" .799	17.29	. . .	..	16.60	0.296	02	14.79	. . .	..	16.66	0.410	02	15.28	0.072	14	16.82	0.422	08
" .808	17.08	. . .	..	16.49	0.305	14	15.28	. . .	..	16.66	0.419	03	15.70	0.081	21	16.70	0.431	04
" .820	17.39	. . .	..	16.66	0.317	02	14.50	. . .	..	16.66	0.431	04	15.70	0.093	12	16.70	0.443	03
" .828	17.04	. . .	..	16.70	0.325	04	14.98	. . .	..	16.70	0.439	00	16.00	0.101	36	16.70	0.451	03
" .840	17.08	. . .	..	16.66	0.337	01	15.28	. . .	..	16.70	0.451	00	16.12	0.113	40	16.70	0.463	01
" .850	17.34	. . .	..	16.60	0.347	08	15.13	. . .	..	16.66	0.461	04	16.16	0.123	35	16.66	0.473	00
" .864	17.08	. . .	..	16.66	0.361	03	15.85	. . .	..	16.70	0.475	01	16.23	0.137	34	15.85	0.487	00
" .873	17.29	. . .	..	16.70	0.370	00	15.85	. . .	..	16.23	0.484	44	16.49	0.146	55	14.98	0.496	11

J. D.	No. 109. Per. 0d.53302			No. 110. Per. 0d.53612			No. 111. Per. 0d.51265			No. 112. Per. not det'd.			No. 113. Per. 0d.51791			No. 114. Per. 0d.59772		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		d.			d.			d.			d.			d.			d.	
3372.527	16.70	0.239	16	16.24	0.235	03	16.70	0.321	28	15.54	. . .	..	16.16	0.106	15	15.90	0.137	03
3377.517	16.70	0.423	07	16.70	0.400	26	15.80	0.184	R	15.44	. . .	..	16.66	0.435	22	16.70	0.345	00
3383.513	14.84	0.013	02	15.80	0.499	29	15.44	0.028	53	15.49	. . .	..	16.60	0.216	13	16.60	0.364	10
3384.514	16.16	0.480	06	16.06	0.427	38	14.79	0.004	04	15.28	. . .	..	16.82	0.181	18	16.41	0.170	18
3664.674	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	15.49	. . .	..	16.82	0.152	29	14.84	0.597	17
3691.533	. . .	. . .	..	15.44	0.250	87	15.54	0.458	66	15.49	. . .	..	14.98	0.079	64	15.18	0.558	06
" .643	14.79	0.071	39	16.41	0.360	01	14.79	0.056	32	15.70	. . .	..	16.12	0.189	55	15.44	0.071	15
3692.540	16.21	0.434	55	15.54	0.184	59	16.41	0.440	11	15.49	. . .	..	15.13	0.051	05	16.41	0.370	29
4067.520	15.54	0.068	39	16.41	0.417	03	15.80	0.160	28	15.28	. . .	..	14.79	0.064	53	15.18	0.579	09
4071.577	16.41	0.388	36	16.16	0.185	03	16.41	0.116	69	15.28	. . .	..	16.16	0.495	66	16.70	0.452	02
4073.585	15.54	0.260	R	14.79	0.048	08	15.90	0.073	62	15.13	. . .	..	17.15	0.432	27	15.66	0.069	40
4077.492	16.60	0.430	17	16.16	0.202	02	16.51	0.392	10	15.18	. . .	..	16.82	0.196	13	16.60	0.390	11
" .581	14.41	0.519	59	16.41	0.291	04	16.41	0.481	61	15.13	. . .	..	16.98	0.285	14	16.60	0.479	12
4078.492	16.41	0.362	35	16.06	0.130	34	16.06	0.367	36	14.98	. . .	..	16.82	0.160	26	16.51	0.195	13
4079.493	16.70	0.295	01	15.80	0.059	88	16.16	0.342	26	15.28	. . .	..	16.49	0.125	21	15.18	0.000	18
" .579	16.51	0.381	27	15.94	0.145	08	15.94	0.428	42	15.13	. . .	..	16.98	0.211	25	16.24	0.086	R
4437.550	15.49	0.092	13	15.54	0.524	60	15.44	0.057	33	15.28	. . .	..	16.00	0.306	86	15.08	0.023	04
4456.502	16.41	0.357	36	16.12	0.175	05	15.18	0.041	18	15.18	. . .	..	15.49	0.095	34	16.70	0.446	02
" .575	16.66	0.430	10	16.60	0.248	30	15.90	0.114	20	15.49	. . .	..	16.82	0.168	25	16.70	0.519	18
4839.480	. . .	. . .	..	. . .	. . .	..	15.44	0.069	22	15.28	. . .	..	17.15	0.338	28	16.41	0.285	21
4840.523	. . .	. . .	..	16.36	0.335	04	. . .	. . .	..	14.98	. . .	..	16.82	0.345	05	15.90	0.133	08
4841.472	16.70	0.370	06	16.94	0.211	70	. . .	. . .	..	15.28	. . .	..	16.82	0.258	01	16.60	0.484	10
" .503	16.60	0.401	18	16.60	0.242	30	14.79	0.042	21	15.28	. . .	..	16.98	0.289	14	16.51	0.515	00
" .571	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	15.28	. . .	..	16.82	0.357	05	15.44	0.583	38
" .603	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	15.29	. . .	..	16.5	0.389	..	15.08	0.017	05
5160.741	17.04	0.355	28	16.16	0.489	07	16.94	0.411	55	. . .	. . .	..	. . .	. . .	..	15.29	0.570	17
" .779	16.66	0.393	12	15.08	0.527	20	15.90	0.449	36	. . .	. . .	..	14.50	0.015	08	15.08	0.011	06
" .788	16.70	0.402	08	14.64	0.536	09	15.90	0.458	29	16.00	. . .	..	14.98	0.024	30	14.74	0.020	30
" .800	16.60	0.414	17	14.69	0.012	02	15.91	0.470	17	16.00	. . .	..	14.98	0.036	17	15.08	0.032	00
" .809	16.70	0.423	06	14.69	0.021	04	15.80	0.479	12	16.36	. . .	..	15.13	0.045	15	15.18	0.041	06
" .822	16.60	0.436	16	14.64	0.034	15	15.54	0.492	33	. . .	. . .	..	15.13	0.058	05	15.18	0.054	01
" .830	16.66	0.444	08	14.79	0.042	04	15.44	0.500	42	. . .	. . .	..	. . .	. . .	..	15.44	0.062	21
" .843	16.94	0.457	25	14.79	0.055	12	15.08	0.001	25	15.70	. . .	..	15.70	0.079	16	15.44	0.075	13
" .853	16.41	0.467	19	14.84	0.065	16	15.18	0.011	33	15.28	. . .	..	16.23	0.089	47	15.32	0.085	04
5161.713	16.60	0.259	02	16.41	0.389	02	16.60	0.358	18	15.49	. . .	..	16.98	0.431	10	16.70	0.347	00
" .722	16.66	0.268	01	16.56	0.398	12	16.60	0.367	18	. . .	. . .	..	16.98	0.440	10	16.70	0.356	00
" .735	16.88	0.281	19	16.56	0.411	12	16.60	0.380	18	15.49	. . .	..	17.15	0.453	28	16.70	0.369	00
" .744	16.76	0.290	06	16.48	0.420	04	16.76	0.389	34	15.85	. . .	..	17.04	0.462	17	16.60	0.378	10
" .756	16.70	0.302	02	16.41	0.432	03	16.60	0.401	20	15.28	. . .	..	16.82	0.474	01	16.88	0.390	17
" .764	16.94	0.310	21	16.60	0.440	15	16.70	0.409	30	15.70	. . .	..	16.36	0.482	16	16.79	0.398	08
" .777	16.66	0.323	07	16.41	0.453	00	16.60	0.422	23	16.00	. . .	..	15.13	0.495	00	16.94	0.411	23
" .786	16.70	0.332	06	16.31	0.462	09	16.41	0.431	08	15.85	. . .	..	14.74	0.504	09	16.70	0.420	01
" .799	16.76	0.345	00	16.41	0.475	09	16.41	0.444	13	16.12	. . .	..	14.46	0.517	06	16.70	0.433	01
" .808	16.70	0.354	06	15.98	0.484	29	15.98	0.453	24	15.70	. . .	..	14.50	0.008	02	16.70	0.442	01
" .820	16.98	0.366	21	16.24	0.496	11	16.41	0.465	29	15.49	. . .	..	14.50	0.020	11	16.66	0.454	07
" .828	16.88	0.374	11	16.31	0.504	59	15.54	0.473	47	15.85	. . .	..	14.79	0.028	08	16.70	0.462	01
" .840	16.94	0.386	16	15.54	0.516	34	15.44	0.485	17	15.49	. . .	..	15.28	0.040	39	16.70	0.474	01
" .850	16.94	0.396	16	14.79	0.526	10	15.29	0.495	20	15.49	. . .	..	14.74	0.050	32	16.79	0.484	09
" .864	16.88	0.410	10	14.79	0.004	09	15.18	0.509	31	16.00	. . .	..	16.00	0.064	68	16.88	0.498	20
" .873	17.04	0.419	26	14.53	0.013	18	14.95	0.005	12	15.70	. . .	..	16.12	0.073	63	16.82	0.507	20

J. D.	No. 115. Per. 0d.51409			No. 116. Per. 0d.51479			No. 117. Per. 0d.60052			No. 118. Per. 0 .49937			No. 119. Per. 0d.51776			No. 120. Per. not det'd.		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		d.			d.			d.			d.			d.			d.	
3372.527	15.44	0.117	01	16.00	0.472	00	16.12	0.576	70	16.49	0.174	20	15.70	0.127	06	16.23	. . .	..
3377.517	15.80	0.480	65	16.49	0.314	15	16.23	0.161	04	16.66	0.171	39	16.70	0.457	00	15.54	. . .	..
3383.513	16.60	0.307	14	15.70	0.132	30	16.00	0.152	19	16.66	0.174	38	16.27	0.240	27	16.36	. . .	..
3384.514	16.60	0.280	10	15.44	0.104	18	16.12	0.553	43	16.49	0.177	18	16.27	0.206	16	15.54	. . .	..
3664.674	16.31	0.261	34	16.49	0.218	01	16.70	0.270	00	16.49	0.190	05	16.66	0.257	08	16.49	. . .	..
3691.533	16.5	0.387	..	16.49	0.308	15	. . .	. . .	..	15.49	0.083	10	16.36	0.193	01	16.36	. . .	..
" .643	16.8	0.497	..	16.36	0.418	33	16.49	0.215	04	16.49	0.193	00	16.49	0.303	17	16.23	. . .	..
3692.540	16.98	0.366	21	16.66	0.285	06	. . .	. . .	..	15.44	0.091	02	16.49	0.164	31	15.70	. . .	..
4067.520	14.92	0.060	16	14.79	0.498	21	16.49	0.167	17	15.28	0.044	30	16.79	0.286	15	15.70	. . .	..
4071.577	14.64	0.005	12	16.66	0.437	08	15.49	0.020	26	16.23	0.106	62	16.51	0.201	10	16.36	. . .	..
4073.585	15.08	0.470	90	16.70	0.386	00	16.49	0.227	09	16.36	0.117	65	15.73	0.138	05	16.60	. . .	..
4077.492	16.94	0.265	28	16.49	0.174	16	15.49	0.531	70	15.28	0.029	46	16.70	0.421	00	16.49	. . .	..
" .581	16.31	0.354	46	16.66	0.263	10	15.49	0.019	26	16.36	0.118	65	14.64	0.510	11	16.60	. . .	..
4078.492	16.66	0.236	08	16.36	0.145	24	16.66	0.330	10	14.98	0.030	15	16.60	0.385	10	16.23	. . .	..
4079.493	16.70	0.209	21	15.70	0.116	08	16.49	0.130	49	15.13	0.033	27	16.70	0.351	00	16.70	. . .	..
" .579	16.94	0.295	21	16.60	0.202	17	16.66	0.216	13	16.12	0.119	40	16.60	0.437	10	15.54	. . .	..
4437.550	16.41	0.460	01	16.82	0.394	12	16.49	0.277	21	14.69	0.041	27	15.49	0.118	00	15.70	. . .	..
4456.502	16.70	0.390	07	16.66	0.299	03	14.98	0.012	25	14.69	0.017	04	16.89	0.430	19	16.49	. . .	..
" .575	16.16	0.463	12	16.49	0.372	21	16.00	0.085	49	15.49	0.090	03	14.92	0.503	20	16.60	. . .	..
4839.480	16.70	0.371	07	16.49	0.273	09	16.66	0.459	13	15.44	0.478	31	16.55	0.266	06	15.54	. . .	..
4840.523	16.31	0.386	R	16.66	0.287	06	16.82	0.301	08	14.79	0.023	00	16.79	0.273	17	16.36	. . .	..
4841.472	16.31	0.307	R	16.00	0.206	44	15.49	0.049	16	16.12	0.472	05	16.51	0.187	18	15.49	. . .	..
" .503	16.94	0.338	17	16.49	0.237	02	15.70	0.080	22	14.74	0.004	04	16.66	0.218	19	15.85	. . .	..
" .571	16.8	0.406	..	16.82	0.305	19	16.36	0.148	19	15.44	0.072	15	16.82	0.286	18	16.00	. . .	..
" .603	14.79	0.438	193	16.82	0.337	14	16.23	0.180	17	15.54	0.104	05	16.49	0.318	19	16.23	. . .	..
5160.741	16.79	0.326	03	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	14.50	0.516	18	. . .	. . .	..
" .779	16.79	0.364	02	16.82	0.343	14	16.82	0.480	04	16.49	0.182	12	14.27	0.036	08	16.23	. . .	..
" .788	16.94	0.373	16	16.60	0.352	09	16.82	0.489	05	16.49	0.191	02	14.41	0.045	01	16.12	. . .	..
" .800	16.70	0.385	08	16.60	0.364	10	16.70	0.501	03	16.60	0.203	04	14.64	0.057	09	15.70	. . .	..
" .809	16.70	0.394	08	16.66	0.373	04	16.70	0.510	02	16.60	0.212	01	14.64	0.066	00	15.70	. . .	..
" .822	16.70	0.407	08	16.66	0.386	04	16.36	0.523	06	16.70	0.225	02	14.79	0.079	00	15.54	. . .	..
" .830	16.66	0.415	11	16.70	0.394	00	16.36	0.531	18	16.66	0.233	06	14.79	0.087	14	15.49	. . .	..
" .843	16.70	0.428	07	16.66	0.407	04	16.36	0.544	55	16.60	0.246	15	15.13	0.100	03	15.28	. . .	..
" .853	17.04	0.438	32	16.70	0.417	01	16.23	0.554	57	16.82	0.256	04	15.39	0.110	01	15.54	. . .	..
5161.713	16.82	0.270	14	16.23	0.248	31	16.36	0.212	17	15.70	0.118	01	16.79	0.452	09	16.31	. . .	..
" .722	16.70	0.279	00	16.48	0.257	08	16.66	0.221	10	15.70	0.127	12	16.70	0.461	01	16.49	. . .	..
" .735	16.76	0.292	03	16.66	0.270	08	16.60	0.234	00	16.00	0.140	06	16.70	0.474	06	16.36	. . .	..
" .744	16.70	0.301	04	16.49	0.279	10	16.60	0.243	03	15.85	0.149	17	16.24	0.483	22	16.49	. . .	..
" .756	16.70	0.313	06	16.60	0.291	01	16.49	0.255	18	16.12	0.161	05	15.39	0.495	00	16.36	. . .	..
" .764	17.04	0.321	29	16.70	0.299	08	16.82	0.263	15	16.36	0.169	12	14.92	0.503	20	16.23	. . .	..
" .777	16.70	0.334	06	16.60	0.312	04	16.82	0.276	11	16.49	0.182	10	14.31	0.516	00	16.36	. . .	..
" .786	16.79	0.343	01	16.66	0.321	00	16.66	0.285	06	16.49	0.191	01	14.20	0.007	03	16.36	. . .	..
" .799	16.94	0.356	16	16.82	0.334	15	16.82	0.298	09	16.49	0.204	06	14.23	0.020	04	16.60	. . .	..
" .808	16.94	0.365	17	16.82	0.343	14	16.70	0.307	05	16.66	0.213	05	14.31	0.029	00	16.23	. . .	..
" .820	16.79	0.377	02	16.82	0.355	13	16.82	0.319	07	16.82	0.225	13	14.41	0.041	01	16.49	. . .	..
" .828	16.76	0.385	01	16.70	0.363	01	16.82	0.327	06	16.82	0.233	10	14.41	0.049	04	16.49	. . .	..
" .840	16.70	0.397	07	16.66	0.375	05	16.70	0.339	06	16.70	0.245	04	14.57	0.061	00	16.23	. . .	..
" .850	16.70	0.407	07	16.70	0.385	00	16.82	0.349	06	16.70	0.255	08	14.79	0.071	10	16.49	. . .	..
" .864	16.94	0.421	17	16.82	0.399	12	16.82	0.363	06	16.82	0.269	03	14.92	0.085	00	16.49	. . .	..
" .873	16.66	0.430	10	16.82	0.408	12	16.82	0.372	06	16.82	0.278	01	14.92	0.094	14	16.60	. . .	..

J. D.	No. 121. Per. 0d.49304			No. 122. Per. not det'd.			No. 123. Per. 0d.54545			No. 124. Per. not det'd.			No. 125. Per. 0d.53881			No. 126. Per. 0d.53550		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		d.			d.			d.			d.			d.			d.	
3372.527	15.80	0.197	67	14.31	....	..	15.18	0.027	19	16.36	....	..	16.51	0.247	02	15.70	0.478	11
3377.517	16.70	0.257	13	14.31	....	..	15.70	0.108	23	16.12	....	..	16.36	0.388	13	15.44	0.113	R
3383.513	16.51	0.336	06	14.41	....	..	15.85	0.104	01	16.23	....	..	16.12	0.457	26	16.16	0.218	10
3384.514	16.12	0.351	42	14.26	....	..	14.98	0.014	06	16.49	....	..	16.41	0.380	08	15.44	0.148	R
3664.674	....	....	..	....	....	..	16.60	0.358	31	15.70	....	..	16.60	0.359	11	16.23	0.242	02
3691.533	16.06	0.206	43	14.22	....	..	16.49	0.490	00	....	....	..	15.85	0.277	65	16.12	0.326	13
" .643	16.31	0.316	26	14.50	....	..	15.28	0.055	07	16 12	....	..	16.36	0.387	13	16.12	0.436	03
3692.540	15.54	0.227	99	14.22	....	..	16.9	0.406	..	15.49	....	..	15.85	0.207	R	15.85	0.262	41
4067.520	14.79	0.004	06	14.74	....	..	16.36	0.117	31	16.36	....	..	15.90	0.175	46	15.70	0.392	53
4071.577	16.41	0.116	69	14.50	....	..	16.98	0.356	07	16.23	....	..	15.66	0.460	15	16.00	0.165	22
4073.585	15.80	0.152	36	14.50	....	..	16.82	0.182	12	16.36	....	..	16.60	0.313	10	14.98	0.031	39
4077.492	16.41	0.115	69	14.92	....	..	16.98	0.271	08	16.36	....	..	15.90	0.449	06	16.00	0.190	26
" .581	16.16	0.204	33	14.92	....	..	16.98	0.360	08	16.23	....	..	15.18	0.538	12	16.23	0.278	02
4078.492	16.31	0.129	39	14.74	....	..	17.04	0.180	35	15.70	....	..	16.48	0.371	01	15.32	0.118	R
4079.493	15.90	0.144	19	15.13	....	..	16.36	0.090	75	16.36	....	..	16.48	0.294	02	15.08	0.048	36
" .579	16.31	0.230	23	14.92	....	..	16.66	0.176	01	16.12	....	..	16.31	0.380	19	15.70	0.134	R
4437.550	16.41	0.254	16	14.60	....	..	....	....	..	16.00	....	..	15.44	0.043	01	16.36	0.392	13
4456.502	15.54	0.470	37	14.74	....	..	16.98	0.193	21	16.23	....	..	15.80	0.136	28	15.32	0.066	28
" .575	15.90	0.050	88	14.26	....	..	16.9	0.266	..	16.23	....	..	15.98	0.209	49	16.00	0.138	12
4839.480	16.21	0.356	32	....	....	..	16.82	0.265	08	16.36	....	..	15.54	0.020	21	16.36	0.161	15
4840.523	16.41	0.413	16	....	....	..	16.66	0.217	18	16.36	....	..	15.98	0.525	68	16.12	0.133	00
4841.472	16.01	0.376	47	....	....	..	15.49	0.075	06	15.70	....	..	16.51	0.396	03	15.54	0.011	24
" .503	16.31	0.407	01	....	....	..	15.54	0.106	35	15.70	....	..	16.41	0.427	07	15.49	0.042	06
" .571	....	....	..	....	....	..	16.82	0.174	18	15.70	....	..	15.54	0.495	08	16.12	0.110	13
" .603	....	....	..	....	....	..	16.49	0.206	33	....	....	..	....	....	..	16.00	0.142	14
5160.741	17.44	0.155	R	....	....	..	....	....	..	16.49	....	..	16.24	0.151	03	16.23	0.122	15
" .779	16.70	0.193	24	14.57	....	..	....	....	..	16.23	....	..	16.41	0.189	01	16.00	0.160	21
" .788	16.41	0.202	08	14.60	....	..	....	....	..	16.23	....	..	16.41	0.198	03	16.36	0.169	13
" .800	16.51	0.214	01	14.57	....	..	....	....	..	16.49	....	..	16.56	0.210	09	16.36	0.181	12
" .809	16.51	0.223	02	14.60	....	..	....	....	..	16.36	....	..	16.56	0.219	08	16.36	0.190	12
" .822	16.70	0.236	15	14.69	....	..	....	....	..	16.49	....	..	16.48	0.232	01	16.23	0.203	03
" .830	16.66	0.244	10	14.69	....	..	....	....	..	16.49	....	..	16.41	0.240	08	16.36	0.211	10
" .843	16.31	0.257	26	14.74	....	..	....	....	..	16.49	....	..	16.48	0.253	02	16.23	0.224	02
" .853	16.31	0.267	26	....	....	..	....	....	..	16.36	....	..	16.51	0.263	01	16.23	0.234	02
5161.713	16.60	0.141	53	14.50	....	..	....	....	..	16.49	....	..	15.54	0.045	11	15.44	0.023	11
" .722	16.60	0.150	44	14.41	....	..	....	....	..	16.36	....	..	15.54	0.054	06	15.39	0.032	01
" .735	16.70	0.163	41	14.74	....	..	....	....	..	16.49	....	..	15.80	0.067	26	16.00	0.045	57
" .744	16.66	0.172	33	14.79	....	..	....	....	..	16.49	....	..	15.54	0.076	06	15.18	0.054	31
" .756	16.51	0.184	09	14.74	....	..	....	....	..	16.49	....	..	15.63	0.88	06	15.54	0.066	06
" .764	16.70	0.192	24	14.92	....	..	....	....	..	16.36	....	..	15.66	0.096	08	16.12	0.074	44
" .777	16.60	0.205	10	14.74	....	..	....	....	..	16.66	....	..	15.85	0.109	00	16.00	0.087	21
" .786	16.66	0.214	15	14.74	....	..	....	....	..	16.49	....	..	15.54	0.118	37	16.12	0.096	25
" .799	16.70	0.227	16	14.74	....	..	....	....	..	16.60	....	..	16.31	0.131	24	16.12	0.109	13
" .808	16.66	0.236	11	14.98	....	..	....	....	..	16.49	....	..	16.16	0.140	04	16.36	0.118	32
" .820	16.70	0.248	14	14.74	....	..	....	....	..	16.23	....	..	16.41	0.152	20	16.23	0.130	13
" .828	16.66	0.256	09	14.60	....	..	....	....	..	16.66	....	..	16.48	0.160	21	16.36	0.138	25
" .840	16.70	0.268	13	14.57	....	..	....	....	..	16.49	....	..	16.60	0.172	26	16.36	0.150	18
" .850	16.60	0.278	03	14.98	....	..	....	....	..	16.49	....	..	16.60	0.182	21	16.36	0.160	15
" .864	16.70	0.292	13	14.60	....	..	....	....	..	16.49	....	..	16.60	0.196	16	16.49	0.174	26
" .873	16.60	0.301	03	14.74	....	..	....	....	..	16.49	....	..	16.56	0.205	10	16.49	0.183	25

J. D.	No. 127. Per. not det'd.			No. 128. Per. 0d.60597			No. 129. Per. not det'd.			No. 130. Per. not det'd.			No. 131. Per. 0d.43720			No. 132. Per. 0d.50665		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		d.			d.			d.			d.			d.			d.	
3372.527	. . .	. . .	..	15.44	0.127	*31*	15.18	. . .	..	15.54	. . .	..	15.80	0.157	10	16.16	0.287	*17*
3377.517	. . .	. . .	..	16.31	0.269	*19*	15.90	. . .	..	15.70	. . .	..	15.54	0.338	*70*	16.31	0.210	10
3383.513	14.36	. . .	..	16.70	0.206	24	15.44	. . .	..	15.49	. . .	..	15.80	0.213	*29*	16.31	0.127	53
3384.514	. . .	. . .	..	. . .	. . .	..	16.06	. . .	..	16.12	. . .	..	16.16	0.340	*06*	15.32	0.114	*36*
3664.674	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..
3691.533	. . .	. . .	..	*16.5*	0.393	..	. . .	. . .	..	15.70	. . .	..	14.79	0.007	*11*	15.08	0.104	*50*
" .643	. . .	. . .	..	15.90	0.503	*34*	15.44	. . .	..	15.28	. . .	..	15.18	0.117	*23*	15.90	0.214	*32*
3692.540	14.41	. . .	..	15.90	0.188	*46*	15.08	. . .	..	15.70	. . .	..	15.44	0.140	*13*	15.08	0.097	*41*
4067.520	14.74	. . .	..	15.08	0.072	*15*	16.31	. . .	..	15.70	. . .	..	15.44	0.002	R	16.41	0.156	43
4071.577	. . .	. . .	..	15.44	0.494	R	16.06	. . .	..	15.28	. . .	..	16.12	0.124	67	16.31	0.160	30
4073.585	14.31	. . .	..	14.69	0.078	R	. . .	. . .	..	16.24	. . .	..	16.06	0.383	55	15.54	0.141	*34*
4077.492	14.31	. . .	..	15.44	0.349	*106*	14.79	. . .	..	15.85	. . .	..	15.63	0.356	*44*	15.18	0.502	24
" .581	14.31	. . .	..	16.70	0.438	20	. . .	. . .	..	15.28	. . .	..	15.03	0.007	13	14.79	0.084	*59*
4078.492	14.31	. . .	..	. . .	. . .	..	15.54	. . .	..	15.70	. . .	..	15.08	0.044	07	15.54	0.489	41
4079.493	14.20	. . .	..	14.84	0.532	R	14.69	. . .	..	15.28	. . .	..	15.18	0.171	*63*	15.18	0.476	R
" .579	. . .	. . .	..	. . .	. . .	..	15.54	. . .	..	15.49	. . .	..	15.59	0.257	*68*	15.13	0.056	*05*
4437.550	14.41	. . .	..	15.44	0.461	*106*	15.85	. . .	..	15.70	. . .	..	15.08	0.161	*65*	15.90	0.332	*47*
4456.502	14.31	. . .	..	15.44	0.022	42	14.69	. . .	..	14.79	. . .	..	15.54	0.313	*75*	14.79	0.031	*22*
" .575	14.41	. . .	..	15.18	0.095	*23*	16.06	. . .	..	14.74	. . .	..	15.32	0.386	*10*	15.18	0.104	*40*
4839.480	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	16.36	. . .	..	15.54	0.304	R	. . .	. . .	..
4840.523	. . .	. . .	..	15.08	0.464	R	. . .	. . .	..	16.23	. . .	..	16.16	0.035	119	16.31	0.011	139
4841.472	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	16.36	. . .	..	15.54	0.110	17	16.70	0.454	31
" .503	14.41	. . .	..	. . .	. . .	..	. . .	. . .	..	16.23	. . .	..	15.18	0.141	*39*	16.06	0.485	80
" .571	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..
" .603	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..	. . .	. . .	..
5160.741	15.54	. . .	..	16.36	0.124	64	16.41	. . .	..	16.12	. . .	..	16.60	0.223	46	16.16	0.026	118
" .779	14.64	. . .	..	16.16	0.162	*03*	15.44	. . .	..	15.49	. . .	..	16.16	0.261	*11*	15.32	0.064	07
" .788	14.69	. . .	..	16.31	0.171	05	15.49	. . .	..	15.28	. . .	..	16.31	0.270	03	15.08	0.074	*22*
" .800	14.36	. . .	..	16.41	0.183	07	16.16	. . .	..	16.12	. . .	..	16.41	0.282	12	15.29	0.086	*12*
" .809	14.64	. . .	..	16.60	0.192	20	15.54	. . .	..	15.85	. . .	..	16.31	0.291	00	15.66	0.094	20
" .822	14.64	. . .	..	16.36	0.205	*10*	15.80	. . .	..	16.23	. . .	..	16.16	0.304	*14*	16.06	0.108	45
" .830	14.31	. . .	..	16.60	0.213	13	15.80	. . .	..	15.70	. . .	..	16.41	0.312	12	15.80	0.116	12
" .843	14.46	. . .	..	16.66	0.226	17	15.18	. . .	..	16.12	. . .	..	16.31	0.325	03	15.66	0.128	*13*
" .853	14.41	. . .	..	16.70	0.236	21	. . .	. . .	..	16.23	. . .	..	16.16	0.335	*09*	15.90	0.138	07
5161.713	14.95	. . .	..	16.41	0.490	03	15.08	. . .	..	14.98	. . .	..	16.41	0.321	13	15.54	0.492	48
" .722	14.69	. . .	..	16.16	0.499	*14*	15.13	. . .	..	14.50	. . .	..	16.48	0.330	22	15.08	0.501	14
" .735	14.64	. . .	..	16.36	0.512	23	15.08	. . .	..	14.79	. . .	..	16.41	0.343	21	14.92	0.007	00
" .744	14.41	. . .	..	16.31	0.521	30	14.69	. . .	..	14.79	. . .	..	16.31	0.352	20	15.08	0.016	15
" .756	14.69	. . .	..	16.41	0.533	54	14.95	. . .	..	15.13	. . .	..	16.12	0.364	23	15.29	0.028	30
" .764	14.53	. . .	..	16.21	0.541	59	15.08	. . .	..	14.50	. . .	..	16.21	0.372	46	15.08	0.036	05
" .777	14.31	. . .	..	15.44	0.554	06	14.79	. . .	..	14.69	. . .	..	15.54	0.385	05	15.18	0.049	05
" .786	14.69	. . .	..	15.85	0.563	57	14.79	. . .	..	14.46	. . .	..	14.95	0.394	*31*	14.79	0.058	*39*
" .799	14.36	. . .	..	15.08	0.576	*10*	15.44	. . .	..	15.28	. . .	..	14.79	0.407	*29*	15.54	0.071	25
" .808	14.64	. . .	..	15.49	0.585	38	15.44	. . .	..	15.28	. . .	..	14.92	0.416	*08*	15.44	0.080	07
" .820	14.36	. . .	..	15.18	0.597	14	15.44	. . .	..	14.98	. . .	..	14.79	0.428	*14*	16.16	0.092	70
" .828	14.41	. . .	..	14.84	0.605	*17*	14.74	. . .	..	14.98	. . .	..	14.79	0.436	*11*	15.54	0.100	01
" .840	14.64	. . .	..	14.79	0.011	*21*	15.18	. . .	..	14.74	. . .	..	14.79	0.010	*12*	15.54	0.112	*10*
" .850	14.69	. . .	..	15.08	0.021	06	15.39	. . .	..	15.28	. . .	..	14.69	0.020	*24*	16.16	0.122	43
" .864	14.64	. . .	..	16.06	0.035	R	15.44	. . .	..	16.00	. . .	..	15.08	0.034	10	16.06	0.136	24
" .873	14.41	. . .	..	15.29	0.044	20	15.44	. . .	..	15.28	. . .	..	14.79	0.043	*22*	16.31	0.145	41

J. D.	No. 133. Per. 0d.55074			No. 134. Per. 0d.61699			No. 135. Per. not det'd.			No. 136. Per. not det'd.			No. 137. Per. 0d.57701		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		d.			d.			d.			d.			d.	
3372.527	. . . .	. . . .	..	16.41	0.247	01	14.79	. . . .	..	15.44	. . . .	..	16.70	0.467	04
3377.517	. . . .	. . . .	..	. . . .	. . . .	..	14.74	. . . .	..	. . . .	. . . .	..	16.41	0.264	05
3383.513	16.41	0.483	07	15.90	0.127	11	14.69	. . . .	..	14.79	. . . .	..	16.60	0.490	07
3384.514	. . . .	. . . .	..	. . . .	. . . .	..	14.31	. . . .	..	. . . .	. . . .	..	16.16	0.337	37
3664.674	. . . .	. . . .	..	. . . .	. . . .	..	. . . .	. . . .	..	. . . .	. . . .	..	. . . .	. . . .	..
3691.533	14.64	0.089	27	16.31	0.269	17	14.69	. . . .	..	14.69	. . . .	..	15.85	0.386	R
" .643	. . . .	. . . .	..	. . . .	. . . .	..	14.69	. . . .	..	. . . .	. . . .	..	16.5	0.496	..
3692.540	15.08	0.545	38	. . . .	. . . .	..	14.69	. . . .	..	14.74	. . . .	..	15.54	0.239	R
4067.520	16.41	0.471	25	16.48	0.509	10	15.08	. . . .	..	15.08	. . . .	..	16.31	0.163	31
4071.577	15.08	0.122	01	16.31	0.247	11	14.69	. . . .	..	14.64	. . . .	..	16.31	0.181	24
4073.585	. . . .	. . . .	..	. . . .	. . . .	..	14.41	. . . .	..	14.69	. . . .	..	16.66	0.458	00
4077.492	14.79	0.530	03	15.44	0.609	14	14.79	. . . .	..	15.18	. . . .	..	16.16	0.326	35
" .581	15.08	0.068	26	15.54	0.081	06	14.79	. . . .	..	14.79	. . . .	..	16.31	0.415	32
4078.492	. . . .	. . . .	..	16.41	0.375	19	14.79	. . . .	..	14.69	. . . .	..	16.16	0.172	12
4079.493	. . . .	. . . .	..	16.06	0.142	14	14.69	. . . .	..	15.08	. . . .	..	15.18	0.019	44
" .579	. . . .	. . . .	..	16.31	0.228	05	14.69	. . . .	..	15.08	. . . .	..	15.66	0.105	04
4437.550	. . . .	. . . .	..	16.60	0.345	01	15.18	. . . .	..	15.32	. . . .	..	16.70	0.330	18
4456.502	14.74	0.080	14	15.49	0.171	63	14.74	. . . .	..	. . . .	. . . .	..	16.31	0.240	02
" .575	. . . .	. . . .	..	16.06	0.244	35	14.79	. . . .	..	15.08	. . . .	..	16.31	0.313	18
4839.480	. . . .	. . . .	..	. . . .	. . . .	..	. . . .	. . . .	..	. . . .	. . . .	..	. . . .	. . . .	..
4840.523	. . . .	. . . .	..	. . . .	. . . .	..	. . . .	. . . .	..	. . . .	. . . .	..	. . . .	. . . .	..
4841.472	. . . .	. . . .	..	. . . .	. . . .	..	. . . .	. . . .	..	. . . .	. . . .	..	. . . .	. . . .	..
" .503	. . . .	. . . .	..	16.41	0.170	29	. . . .	. . . .	..	. . . .	. . . .	..	. . . .	. . . .	..
" .571	. . . .	. . . .	..	. . . .	. . . .	..	. . . .	. . . .	..	. . . .	. . . .	..	. . . .	. . . .	..
" .603	. . . .	. . . .	..	. . . .	. . . .	..	. . . .	. . . .	..	. . . .	. . . .	..	. . . .	. . . .	..
5160.741	17.04	0.473	40	16.88	0.424	27	15.44	. . . .	..	15.54	. . . .	..	16.70	0.527	05
" .779	14.79	0.511	19	16.41	0.462	19	14.15	. . . .	..	14.69	. . . .	..	14.64	0.565	08
" .788	14.84	0.520	01	16.60	0.471	01	14.26	. . . .	..	14.79	. . . .	..	14.69	0.574	04
" .800	14.64	0.532	10	16.41	0.483	19	14.41	. . . .	..	14.79	. . . .	..	14.64	0.009	04
" .809	14.79	0.541	08	15.60	0.492	00	14.15	. . . .	..	15.44	. . . .	..	14.69	0.018	03
" .822	14.79	0.003	09	16.70	0.505	11	14.31	. . . .	..	15.18	. . . .	..	15.18	0.031	30
" .830	14.79	0.011	09	16.70	0.513	12	14.41	. . . .	..	14.89	. . . .	..	15.08	0.039	15
" .843	14.69	0.024	03	16.60	0.526	04	14.41	. . . .	..	15.18	. . . .	..	15.18	0.052	05
" .853	14.69	0.034	04	16.41	0.536	11	14.41	. . . .	..	14.79	. . . .	..	15.18	0.062	04
5161.713	16.70	0.343	11	16.16	0.162	10	14.31	. . . .	..	15.29	. . . .	..	16.56	0.345	00
" .722	16.66	0.352	05	16.06	0.171	06	14.36	. . . .	..	15.18	. . . .	..	16.41	0.354	16
" .735	16.56	0.365	08	16.16	0.184	02	14.41	. . . .	..	15.08	. . . .	..	16.70	0.367	12
" .744	16.41	0.374	25	16.41	0.193	18	14.74	. . . .	..	15.08	. . . .	..	16.60	0.376	01
" .756	16.70	0.386	03	16.41	0.205	13	14.41	. . . .	..	14.69	. . . .	..	16.60	0.388	00
" .764	16.70	0.394	02	16.16	0.213	15	14.69	. . . .	..	15.18	. . . .	..	16.60	0.396	02
" .777	16.31	0.407	38	16.31	0.226	04	14.64	. . . .	..	15.18	. . . .	..	16.66	0.409	03
" .786	16.60	0.416	10	16.31	0.235	07	14.64	. . . .	..	14.84	. . . .	..	16.60	0.418	03
" .799	16.70	0.429	00	16.48	0.248	05	14.69	. . . .	..	14.79	. . . .	..	16.60	0.431	04
" .808	16.82	0.438	12	16.21	0.257	23	14.41	. . . .	..	15.54	. . . .	..	16.60	0.440	05
" .820	16.94	0.450	24	16.70	0.269	22	14.79	. . . .	..	15.54	. . . .	..	16.76	0.452	10
" .828	16.94	0.458	25	16.56	0.277	07	14.41	. . . .	..	15.08	. . . .	..	16.60	0.460	06
" .840	16.88	0.470	21	16.31	0.289	21	14.41	. . . .	..	15.08	. . . .	..	16.79	0.472	12
" .850	16.60	0.480	01	16.16	0.299	37	14.31	. . . .	..	15.18	. . . .	..	16.60	0.482	07
" .864	16.16	0.494	18	16.70	0.313	15	14.31	. . . .	..	15.44	. . . .	..	16.70	0.496	03
" .873	15.44	0.503	08	16.66	0.322	09	14.41	. . . .	..	15.18	. . . .	..	16.70	0.505	03

TABLE X

ADDITIONAL OBSERVATIONS OF THE VARIABLES

No.	J. D.	Magn.	Phase	Res.	No.	J. D.	Magn.	Phase	Res.	No.	J. D.	Magn.	Phase	Res.
	d.		*d.*			*d.*		*d.*			*d.*		*d.*	
2	4074.589	14.98	....	..	10	4080.486	14.84	0.030	05	14	4140.478	15.08	0.126	*31*
"	4078.579	15.28	....	..	"	4085.487	15.18	0.476	R	15	3694.533	14.50	0.525	*12*
3	3386.535	14.41	0.558	*09*	"	" .561	14.79	0.550	*09*	"	3747.564	14.79	0.048	*08*
"	3390.524	14.74	0.074	*21*	11	3378.520	16.66	0.435	08	"	4074.589	14.79	0.013	23
"	3400.521	14.46	0.008	*07*	"	3380.551	16.12	0.434	*46*	16	3378.520	14.74	0.016	*07*
"	3693.568	15.18	0.108	01	"	3389.545	16.49	0.286	*07*	"	3380.551	14.46	0.001	*25*
4	3395.513	14.10	....	..	"	3390.524	16.49	0.249	*04*	"	3397.535	15.28	0.106	*24*
"	3692.651	14.10	....	..	"	3395.513	15.49	0.159	*51*	"	3399.520	15.13	0.045	11
"	4074.589	14.46	....	..	"	3399.520	14.95	0.103	*37*	"	3400.521	14.69	0.023	*17*
"	4078.579	14.69	....	..	"	3400.521	14.63	0.088	*50*	"	3693.568	14.79	0.498	17
"	4080.486	14.31	....	..	"	3724.507	14.57	0.034	07	"	" .611	15.13	0.029	24
"	" .570	14.41	....	..	"	" .664	16.00	0.191	*33*	"	3694.655	15.28	0.050	20
"	4140.478	14.79	....	..	"	4036.555	16.76	0.231	25	"	4074.589	15.28	0.459	08
"	4438.541	14.31	....	..	"	4074.589	16.23	0.173	07	17	3395.513	15.28	0.057	00
5	3399.520	15.08	0.101	*25*	"	4078.579	15.54	0.100	25	"	3399.520	15.44	0.031	35
"	3400.521	15.18	0.090	*01*	"	4080.486	14.57	0.483	*33*	"	3694.533	15.13	0.071	*34*
"	4085.487	15.66	0.108	27	"	" .570	15.18	0.059	40	"	3721.510	15.28	0.546	*07*
"	4438.541	15.08	0.065	27	"	4084.540	14.57	0.474	*103*	"	" .641	15.28	0.101	R
6	3389.545	14.79	0.052	*46*	"	4085.487	16.66	0.405	06	"	3724.507	15.28	0.086	*38*
"	3390.524	14.79	0.002	39	"	" .561	14.50	0.479	*75*	"	4807.613	15.18	0.087	*49*
"	3694.533	14.79	0.042	*30*	"	4438.541	16.00	0.469	00	18	3389.545	15.13	0.006	13
"	4074.589	14.79	0.009	32	"	4807.613	16.66	0.297	10	"	3692.651	14.79	0.026	*28*
"	4140.478	15.18	0.063	*20*	"	4839.521	16.36	0.207	*07*	"	3693.654	15.13	0.513	13
7	3380.551	14.46	0.001	06	"	" .563	16.23	0.249	*30*	"	3724.664	14.79	0.027	*28*
"	3386.535	14.31	0.016	*13*	"	" .604	16.49	0.290	*07*	"	4084.540	15.44	0.021	41
"	3390.524	14.36	0.025	*15*	"	4841.537	16.23	0.192	*10*	"	4085.561	15.13	0.009	13
"	3395.513	14.36	0.040	*30*	"	4842.489	16.12	0.128	46	19	3693.611	15.44	0.075	*35*
"	3397.535	14.50	0.072	*56*	12	3386.535	15.13	....	..	"	4085.487	15.54	0.405	*06*
"	3399.520	14.50	0.068	R	"	3395.513	15.13	....	..	20	3378.520	14.69	0.065	*32*
9	3378.520	15.13	0.533	R	"	3400.521	15.13	....	..	"	4074.589	14.84	0.467	34
"	3397.535	14.46	0.051	*29*	"	3693.568	14.98	....	..	"	4078.579	14.69	0.035	*04*
"	3692.651	14.79	0.012	21	"	3694.533	15.13	....	..	"	4080.486	14.69	0.468	19
"	4036.555	15.32	0.019	*72*	"	3724.507	15.28	....	..	"	" .570	15.08	0.061	09
"	4140.478	15.13	0.502	*72*	"	4085.487	14.98	....	..	"	4084.540	15.54	0.101	15
10	3380.551	14.64	0.011	*12*	"	4140.478	14.98	....	..	"	4085.487	14.69	0.065	*32*
"	3400.521	14.84	0.049	*02*	13	3390.524	14.74	0.047	06	"	4140.478	14.69	0.032	00
"	3412.504	15.13	0.072	09	"	3747.564	15.13	0.098	07	"	4807.613	14.74	0.486	29
"	3692.651	14.79	0.025	01	"	4074.589	15.13	0.085	20	21	3389.545	15.08	0.082	*33*
"	3721.641	15.08	0.541	09	14	3380.551	14.74	0.031	12	"	3390.524	14.84	0.028	*12*
"	3724.507	14.79	0.559	*01*	"	3389.545	15.13	0.138	*40*	"	3724.664	14.92	0.018	01
"	4036.555	15.08	0.521	*55*	"	3694.655	14.79	0.554	*01*	"	4080.486	14.84	0.516	*07*

No.	J. D.	Magn.	Phase	Res.	No.	J. D.	Magn.	Phase	Res.	No.	J. D.	Magn.	Phase	Res.
	d.		d.			d.		d.			d.		d.	
22	3378.520	14.74	0.061	31	30	3390.524	14.69	....	..	39	3378.520	15.49	0.129	32
"	3390.524	14.79	0.029	35	"	3395.513	14.41	....	..	"	3395.513	15.18	0.096	26
"	3724.664	14.79	0.035	25	"	4074.589	14.74	....	..	"	3412.504	14.98	0.062	13
"	4080.486	14.79	0.058	16	"	4078.579	14.79	....	..	"	4080.570	15.18	0.019	48
23	3378.520	14.69	0.062	01	31	3395.513	14.36	0.033	19	"	4140.478	15.13	0.044	18
"	3397.535	14.74	0.546	05	"	3413.503	14.50	0.020	01	40	3693.525	14.74	0.074	28
"	3400.521	14.50	0.544	21	"	4036.555	14.46	0.519	94	"	" .568	15.13	0.117	38
"	3694.655	14.50	0.575	03	"	4438.541	14.98	0.062	27	"	" .611	15.28	0.160	86
"	3724.507	15.13	0.538	00	32	3693.568	14.64	0.009	29	"	3694.655	15.13	0.099	17
"	4078.579	14.98	0.133	05	"	3747.564	14.64	0.011	27	"	3747.564	14.98	0.530	03
"	4080.486	15.13	0.246	47	"	4807.613	14.46	0.485	08	"	4036.555	14.79	0.064	13
"	4084.540	14.79	0.116	15	33	3413.503	14.92	0.015	14	"	4074.589	15.13	0.535	24
"	4140.478	15.13	0.461	88	"	3694.533	14.74	0.047	36	"	4084.540	14.79	0.542	04
24	3378.520	15.08	0.029	25	"	3724.507	15.49	0.083	15	"	4807.613	15.28	0.524	00
"	3380.551	14.74	0.066	22	"	" .664	14.46	0.240	R	41	3399.520	15.18	0.428	62
"	3386.535	15.08	0.069	13	"	3747.564	14.95	0.030	04	"	3724.507	15.44	0.009	44
"	3390.524	15.44	0.070	R	"	4080.486	14.79	0.481	48	"	4078.579	14.79	0.020	21
"	3693.568	14.79	0.066	17	34	3378.520	15.32	0.549	24	"	4080.486	14.79	0.470	27
"	" .611	14.74	0.109	R	"	3397.535	15.44	0.555	42	"	4438.541	15.08	0.093	50
"	4036.555	14.95	0.130	36	"	3724.664	15.08	0.057	10	42	3389.545	14.46	0.579	19
"	4085.561	14.79	0.621	12	"	3747.564	14.79	0.035	28	"	3395.513	14.46	0.054	10
"	4438.541	14.79	0.045	08	"	4036.555	15.13	0.535	08	"	3693.568	14.79	0.048	32
25	3389.545	15.18	0.116	82	"	4074.589	14.84	0.551	21	"	3724.507	15.54	0.296	70
"	3399.520	14.74	0.013	09	"	4807.613	14.79	0.049	34	43	3390.524	14.46	0.052	28
"	3400.521	14.79	0.054	03	35	3378.520	14.50	0.022	18	"	3397.535	15.08	0.036	41
"	3412.504	15.08	0.040	32	"	3395.513	14.69	0.032	03	"	3692.651	14.36	0.034	30
"	3413.503	15.18	0.079	01	"	3412.504	14.98	0.041	20	"	4078.579	14.69	0.038	01
"	3694.655	14.84	0.009	20	36	3389.545	15.08	0.052	08	"	4084.540	15.18	0.053	42
"	3721.510	15.54	0.470	78	"	3395.513	14.79	0.019	04	"	4085.561	14.74	0.533	08
"	3724.507	15.54	0.107	26	"	3413.503	14.79	0.005	01	"	4438.541	15.08	0.020	R
"	4078.579	14.64	0.013	02	"	3694.533	15.08	0.067	21	44	3399.520	15.44	0.151	66
"	4080.486	14.41	0.001	23	"	3724.507	14.92	0.034	03	"	3721.510	15.08	0.070	03
"	4140.478	14.69	0.005	05	"	4078.579	15.18	0.031	25	"	3724.507	14.31	0.029	40
"	4438.541	14.69	0.050	11	"	4084.540	14.79	0.537	02	"	4080.486	14.84	0.009	07
"	4807.613	15.44	0.079	27	37	3380.551	14.98	....	..	"	4438.541	14.79	0.039	10
26	3693.654	14.79	0.018	26	"	3399.520	15.18	....	..	45	3378.520	15.08	0.000	28
"	3747.564	15.54	0.130	14	"	3400.521	15.18	....	..	"	3399.520	15.18	0.062	40
"	4078.579	14.64	0.590	10	"	3724.507	15.13	....	..	"	3400.521	14.69	0.526	12
"	4084.540	14.92	0.573	00	"	4074.589	15.28	....	..	"	4078.579	14.79	0.517	15
"	4438.541	15.44	0.109	00	"	4080.486	15.08	....	..	"	4084.540	15.49	0.036	27
27	3399.520	15.13	0.008	11	"	4085.487	15.44	....	..	"	4085.561	14.98	0.520	14
"	3747.564	15.28	0.016	19	"	4438.541	15.13	....	..	46	3389.545	15.29	0.061	41
"	4080.486	14.95	0.564	09	"	4807.613	15.28	....	..	"	4074.589	15.44	0.553	87
"	" .570	15.49	0.068	22	38	3694.533	15.28	0.048	33	"	4807.613	15.44	0.042	15
"	4084.540	15.13	0.557	06	"	4080.570	15.28	0.103	17	47	4074.589	14.74	0.473	56

No.	J. D.	Magn.	Phase	Res.	No.	J. D.	Magn.	Phase	Res.	No.	J. D.	Magn.	Phase	Res.
	d.		*d.*			*d.*		*d.*			*d.*		*d.*	
47	4080.570	14.69	0.503	*18*	55	3694.533	14.50	0.097	*61*	61	4085.487	15.08	0.050	15
"	4085.487	15.08	0.009	18	"	3747.564	14.98	0.071	01	62	3378.520	15.44	0.610	15
48	3399.520	15.44	0.025	36	"	4078.579	14.79	0.010	26	"	3380.551	15.08	0.031	*21*
"	3692.651	15.18	0.601	00	"	4085.487	14.46	0.021	*14*	"	3395.513	15.08	0.640	*18*
"	3694.533	15.18	0.599	*04*	"	" .561	14.98	0.095	*12*	"	3397.535	15.49	0.052	11
"	3724.664	15.08	0.596	*18*	56	3386.535	15.28	0.472	25	"	3412.504	15.08	0.016	18
"	4080.570	15.44	0.539	*55*	"	3390.524	15.18	0.002	28	"	3693.611	15.44	0.587	06
"	4438.541	15.08	0.037	*06*	"	3395.513	15.28	0.037	26	"	4074.589	15.54	0.557	*08*
"	4807.613	15.54	0.590	24	"	4084.540	15.44	0.388	*68*	"	4078.579	15.54	0.633	28
49	3397.535	15.08	0.077	*16*	"	4085.561	15.44	0.418	28	"	4080.486	15.18	0.582	*22*
"	4080.486	14.74	0.507	*15*	57	4036.555	14.79	0.059	*23*	"	4140.478	15.44	0.553	*26*
"	" .570	15.54	0.043	53	"	4078.579	14.79	0.019	09	63	3380.551	15.13	0.556	35
"	4085.487	15.54	0.026	63	"	4080.570	15.44	0.471	*39*	"	3395.513	15.49	0.116	*36*
"	4438.541	14.79	0.033	*17*	"	4807.613	15.44	0.123	*31*	"	3400.521	14.74	0.561	*04*
50	3378.520	15.70	0.121	14	58	3378.520	15.54	0.139	14	"	3412.504	14.79	0.565	06
"	3398.510	14.98	0.100	*28*	"	3395.513	15.08	0.081	15	"	3724.507	15.54	0.548	54
"	3399.520	14.98	0.084	*14*	"	3399.520	15.13	0.471	33	"	4036.555	15.08	0.006	33
"	3400.521	14.69	0.059	*22*	"	3400.521	14.79	0.439	*33*	"	4080.486	15.54	0.015	R
"	3694.533	14.98	0.064	02	"	3412.504	14.79	0.021	16	"	4084.540	15.54	0.076	01
"	4085.487	15.28	0.036	48	"	3413.503	14.79	0.503	17	64	3380.551	14.84	0.024	*20*
"	4438.541	15.28	0.077	22	"	3693.568	14.79	0.511	18	"	3397.535	14.84	0.055	*51*
51	3397.535	15.28	0.125	*54*	"	" .611	14.74	0.037	06	"	3400.521	14.84	0.014	*18*
"	3693.525	15.13	0.032	11	"	3694.533	15.08	0.443	01	"	3693.525	15.18	0.580	*06*
"	" .568	15.54	0.075	24	"	" .655	14.79	0.048	04	"	" .568	15.18	0.018	15
"	" .611	15.54	0.118	*18*	"	3721.510	14.79	0.034	11	"	3724.507	15.49	0.078	*11*
"	3694.655	15.44	0.578	38	"	3724.507	15.08	0.447	01	"	4078.579	15.44	0.562	*18*
"	3721.510	15.13	0.570	*05*	"	" .664	14.46	0.088	R	"	4807.613	15.18	0.016	16
"	3724.507	14.98	0.063	*22*	"	4036.555	14.92	0.402	*70*	65	3395.513	15.08	0.081	*06*
52	3397.535	14.46	0.077	*54*	"	4078.579	14.69	0.056	*09*	"	3397.535	14.92	0.098	*41*
"	3398.510	14.79	0.020	26	"	4080.570	14.64	0.497	01	"	3399.520	14.92	0.078	*16*
"	3399.520	14.50	0.513	*03*	"	4140.478	15.13	0.467	30	"	3413.503	14.79	0.026	15
"	3413.503	14.74	0.042	08	"	4807.613	14.79	0.013	17	"	3693.525	14.79	0.013	24
"	4080.486	15.08	0.069	18	59	3693.568	14.98	0.003	12	"	" .568	15.08	0.056	20
"	4084.540	14.69	0.509	00	"	" .611	15.13	0.046	01	"	3721.641	15.08	0.059	16
53	3692.651	14.50	0.011	15	"	4084.540	15.13	0.005	26	"	4080.486	14.84	0.006	32
"	3694.655	14.98	0.500	59	"	4140.478	15.13	0.006	26	"	" .570	15.54	0.090	28
"	3724.507	14.74	0.059	*28*	"	4807.613	14.74	0.019	*12*	"	4084.540	15.44	0.050	R
"	4085.487	15.28	0.042	48	61	3378.520	14.79	0.012	04	"	4807.613	15.08	0.647	33
"	4140.478	14.50	0.000	17	"	3389.545	15.08	0.097	*45*	66	3389.545	15.13	0.063	*25*
54	3693.525	14.41	0.478	*37*	"	3390.524	14.46	0.034	*38*	"	3399.520	15.28	0.114	*46*
"	" .568	14.50	0.020	*05*	"	3400.521	15.13	0.133	*95*	"	3412.504	15.28	0.073	*18*
"	3694.533	14.41	0.483	*19*	"	3412.504	14.92	0.134	*116*	"	3694.655	15.28	0.015	18
"	4140.478	14.98	0.040	23	"	3413.503	14.79	0.091	*69*	"	3724.507	15.28	0.095	*33*
55	3399.520	15.28	0.081	28	"	3692.651	15.18	0.010	43	67	3413.503	14.98	0.010	R
"	3400.521	14.50	0.021	*10*	"	3724.507	15.08	0.088	*36*	68	3386.535	15.44	0.466	*54*

No.	J. D.	Magn.	Phase	Res.	No.	J. D.	Magn.	Phase	Res.	No.	J. D.	Magn.	Phase	Res.
	d.		d.			d.		d.			d.		d.	
68	3395.513	15.08	0.098	00	72	3721.510	14.69	0.453	27	77	3694.533	15.08	0.116	64
"	3693.525	15.54	0.089	52	"	3747.564	14.79	0.054	09	"	4438.541	15.18	0.452	R
"	3694.533	15.08	0.059	18	"	4078.579	14.74	0.415	76	78	3390.524	14.74	0.041	01
"	4074.589	15.18	0.061	28	"	4080.486	15.18	0.042	45	"	4807.613	14.74	0.536	58
"	4084.540	15.44	0.147	16	"	4084.540	14.84	0.447	38	79	3390.524	14.84	0.050	32
"	4140.478	15.13	0.011	18	"	4085.487	14.69	0.026	12	"	3724.664	15.18	0.313	142
"	4807.613	14.46	0.493	67	"	4438.541	15.18	0.078	04	"	4036.555	15.08	0.102	61
69	3378.520	15.54	0.107	08	73	3413.503	15.54	....	..	"	4078.579	15.44	0.028	43
"	3395.513	15.18	0.102	24	"	4080.486	15.54	....	..	"	4140.478	15.54	0.474	57
"	3400.521	15.18	0.011	18	"	" .570	15.44	....	..	"	4438.541	14.64	0.467	38
"	3693.611	15.18	0.169	95	"	4084.540	15.44	....	..	80	3378.520	15.08	0.107	29
"	" .654	15.13	0.212	137	"	4140.478	15.44	....	..	"	3380.551	14.64	0.520	19
"	4080.486	15.32	0.056	19	74	3386.535	15.03	0.005	29	"	3386.535	14.79	0.032	03
"	4085.487	15.44	0.524	18	"	3389.545	14.84	0.062	42	"	3399.520	15.44	0.073	36
"	4140.478	15.18	0.555	16	"	3390.524	14.74	0.057	42	"	3400.521	14.79	0.535	02
"	4438.541	15.08	0.020	07	"	3692.651	14.79	0.004	05	"	3413.503	15.08	0.033	25
70	3378.520	15.54	....	..	"	3693.654	14.74	0.022	09	"	3694.655	15.54	0.189	56
"	3389.545	15.18	....	..	"	3694.655	15.08	0.039	13	"	4080.570	15.49	0.476	00
"	3390.524	15.08	....	..	"	3724.664	14.46	0.027	38	"	4085.487	14.69	0.539	08
"	3395.513	15.08	....	..	"	4074.589	15.13	0.033	22	"	" .561	14.79	0.074	29
"	3413.503	15.44	....	..	"	4080.486	15.08	0.024	24	81	3378.520	14.79	0.051	09
"	3693.525	15.44	....	..	"	4140.478	14.64	0.466	34	"	3380.551	15.18	0.494	00
"	3694.533	15.18	....	..	75	3378.520	15.44	....	..	"	3397.535	15.13	0.018	35
"	3721.641	15.08	....	..	"	3389.545	15.08	....	..	"	3413.503	15.18	0.113	26
"	3724.507	14.84	....	..	"	3390.524	15.44	....	..	"	3724.507	14.69	0.006	07
"	" .664	15.08	....	..	"	3395.513	15.08	....	..	"	4080.570	14.79	0.514	02
"	3747.564	15.49	....	..	"	3400.521	15.44	....	..	"	4140.478	15.44	0.105	10
"	4036.555	15.18	....	..	"	3693.525	15.18	....	..	"	4807.613	14.64	0.045	20
"	4074.589	15.44	....	..	"	" .568	15.18	....	..	82	3413.503	15.28	0.518	37
"	4080.486	15.44	....	..	"	" .611	15.44	....	..	"	3693.525	14.79	0.051	09
"	4085.561	15.18	....	..	"	3694.533	15.08	....	..	"	" .568	14.98	0.094	08
"	4438.541	15.13	....	..	"	3724.664	15.08	....	..	"	3724.507	14.98	0.043	12
"	4807.613	15.08	....	..	"	3747.564	15.13	....	..	"	3747.564	15.08	0.514	15
71	3390.524	14.95	0.005	00	"	4078.579	15.18	....	..	"	4036.555	14.98	0.086	05
"	3395.513	15.13	0.052	34	"	4080.486	14.89	....	..	"	4080.570	14.79	0.505	21
"	3693.568	15.08	0.528	05	"	4084.540	15.18	....	..	"	4807.613	14.84	0.063	07
"	" .611	15.18	0.021	06	"	4085.487	15.08	....	..	83	3378.520	14.41	0.055	21
"	3694.655	15.44	0.516	26	"	4140.478	15.18	....	..	"	3380.551	14.50	0.081	26
"	4074.589	15.08	0.515	06	"	4438.541	15.18	....	..	"	3386.535	14.74	0.050	15
"	4140.478	14.92	0.519	21	"	4807.613	15.08	....	..	"	3389.545	14.69	0.053	08
"	4807.613	15.13	0.021	00	77	3399.520	14.79	0.458	16	"	3390.524	14.69	0.029	15
72	3378.520	15.44	0.431	72	"	3400.521	14.69	0.081	52	"	4036.555	14.98	0.457	22
"	3389.545	14.79	0.054	08	"	3692.651	14.46	0.071	60	84	3386.535	15.44	0.566	27
"	3399.520	15.08	0.452	67	"	3693.568	15.08	0.069	05	"	3389.545	15.18	0.002	35
"	3694.655	14.79	0.050	03	"	" .611	15.18	0.112	51	"	3395.513	15.03	0.012	16

No.	J. D.	Magn.	Phase	Res.	No.	J. D.	Magn.	Phase	Res.	No.	J. D.	Magn.	Phase.	Res.
	d.		d.			d.		d.			d.		d.	
84	3694.533	15.18	0.572	10	88	3747.564	14.98	0.065	*13*	93	3389.545	15.18	0.600	14
"	3747.564	15.18	0.583	24	"	4078.579	14.98	0.065	*13*	"	3724.507	15.28	0.070	*05*
"	4036.555	15.18	0.049	*16*	91	3378.520	16.66	0.322	*03*	"	4078.579	15.28	0.580	24
"	4074.589	15.18	0.552	*26*	"	3380.551	16.23	0.232	*26*	"	4084.540	15.44	0.518	17
"	4080.570	15.08	0.576	04	"	3386.535	16.82	0.384	07	94	3693.525	14.79	0.511	06
85	3378.520	15.18	....	..	"	3389.545	16.49	0.213	08	"	" .568	14.98	0.030	10
"	3380.551	15.84	....	..	"	3390.524	16.11	0.132	10	"	" .611	15.13	0.070	*38*
"	3389.545	15.13	....	..	"	3395.513	16.66	0.349	*06*	"	3694.655	15.44	0.069	*06*
"	3390.524	14.79	....	..	"	3397.535	16.49	0.250	*04*	"	3724.507	15.32	0.071	*19*
"	3395.513	15.13	....	..	"	3398.510	16.23	0.165	02	"	3747.564	15.28	0.085	*52*
"	3399.520	15.23	....	..	"	3399.520	15.70	0.114	*18*	"	4036.555	14.79	0.517	12
"	3400.521	14.79	....	..	"	3400.521	14.98	0.055	*14*	"	4080.486	15.28	0.457	*122*
"	3692.651	15.08	....	..	"	3412.504	16.66	0.374	*09*	"	" .570	14.98	0.018	22
"	3721.510	14.84	....	..	"	3413.503	16.49	0.313	*18*	95	3378.520	13.45	....	..
"	3724.664	15.18	....	..	"	3692.651	15.08	0.050	00	"	3380.551	13.40	....	..
"	4080.486	15.13	....	..	"	3693.525	16.82	0.394	06	"	3386.535	13.45	....	..
"	4085.487	15.13	....	..	"	" .568	16.82	0.437	05	"	3389.545	13.40	....	..
"	" .561	15.44	....	..	"	" .611	16.82	0.480	09	"	3390.524	13.45	....	..
86	3386.535	15.32	0.366	*110*	"	3694.533	16.66	0.342	*06*	"	3395.513	13.50	....	..
"	3389.545	15.44	0.063	26	"	" .655	16.82	0.464	07	"	3397.535	13.50	....	..
"	3413.503	15.08	0.411	04	"	3721.510	16.49	0.279	*11*	"	3398.510	13.50	....	..
"	3693.568	15.44	0.063	25	"	" .641	16.66	0.410	*11*	"	3399.520	13.55	....	..
"	" .611	15.44	0.106	04	"	3724.507	14.98	0.095	*74*	"	3400.521	13.55	....	..
"	3721.641	15.08	0.385	*19*	"	" .664	16.49	0.252	*05*	"	3412.504	13.55	....	..
"	3724.664	15.18	0.094	*12*	"	3747.564	16.82	0.354	09	"	3413.503	13.70	....	..
"	4036.555	15.44	0.092	15	"	4036.555	16.66	0.391	*10*	"	3692.651	13.45	....	..
"	4074.589	15.44	0.020	37	"	4074.589	16.66	0.251	12	"	3693.525	13.35	....	..
"	4080.486	15.54	0.118	13	"	4078.579	14.98	0.530	10	"	" .568	13.40	....	..
"	4084.540	15.08	0.030	*01*	"	4080.486	16.82	0.316	15	"	" .611	13.40	....	..
"	4085.487	15.44	0.149	*08*	"	" .570	16.82	0.400	06	"	" .654	13.40	....	..
"	4140.478	15.08	0.051	*06*	"	4084.540	16.00	0.129	01	"	3694.533	13.35	....	..
87	3389.545	15.44	....	..	"	4085.487	14.98	0.015	10	"	" .655	13.50	....	..
"	3395.513	15.08	....	..	"	" .561	15.54	0.089	*07*	"	3747.564	13.80	....	..
"	3399.520	15.54	....	..	"	4140.478	16.66	0.386	*10*	"	4036.555	14.10	....	..
"	3692.651	15.08	....	..	"	4438.541	16.49	0.493	*19*	"	4074.589	13.35	....	..
"	3693.611	15.54	....	..	"	4807.613	14.79	0.023	*11*	"	4078.579	13.35	....	..
"	3721.641	15.18	....	..	92	3378.520	14.98	0.027	15	"	4080.486	13.35	....	..
"	3724.507	15.44	....	..	"	3380.551	14.98	0.044	00	"	" .570	13.35	....	..
"	4080.486	15.54	....	..	"	3386.535	15.13	0.489	00	"	4084.540	13.30	....	..
"	4085.487	15.49	....	..	"	3724.507	15.08	0.076	*13*	"	4085.487	13.30	....	..
"	4140.478	15.49	....	..	"	4036.555	15.28	0.426	R	"	" .561	13.30	....	..
"	4807.613	15.18	....	..	"	4085.487	14.74	0.010	*02*	"	4140.478	14.00	....	..
88	3390.524	15.13	0.207	*75*	"	4438.541	14.98	0.076	*23*	"	4438.541	14.00	....	..
"	3397.535	14.69	0.022	*07*	"	4807.613	14.74	0.045	*22*	"	4807.613	13.40	....	..
"	3399.520	15.28	0.044	37	93	3380.551	14.98	0.039	*12*	"	4839.521	13.40	....	..

No.	J. D.	Magn.	Phase	Res.	No.	J. D.	Magn.	Phase	Res.	No.	J. D.	Magn.	Phase	Res.
	d.		d.			d.		d.			d.		d.	
95	4839.563	13.35	....	..	100	4080.570	15.54	0.145	73	111	3386.535	15.08	0.487	52
"	" .604	13.35	....	..	101	4036.555	15.49	0.575	00	"	3692.651	14.69	0.038	28
"	4841.537	13.35	....	..	"	4074.589	15.13	0.621	11	"	4036.555	14.69	0.467	143
"	4842.489	13.40	....	..	"	4085.487	15.28	0.573	22	"	4085.487	15.32	0.184	91
96	3378.520	16.66	0.258	15	102	3390.524	16.12	....	..	114	3378.520	15.54	0.153	R
"	3380.551	16.82	0.291	22	"	4080.570	16.12	....	..	"	3397.535	14.84	0.041	28
"	3389.545	16.49	0.294	11	"	4085.487	16.60	....	..	"	3694.533	15.18	0.570	05
"	3390.524	16.49	0.274	08	"	4140.478	16.41	....	..	"	3724.507	15.18	0.060	03
"	3395.513	16.82	0.269	26	104	3747.564	14.74	0.032	03	"	4085.487	15.18	0.017	15
"	3399.520	16.23	0.280	35	"	4074.589	14.74	0.537	06	"	4140.478	15.44	0.018	41
"	3400.521	16.49	0.282	10	"	4078.579	14.50	0.531	22	"	4807.613	15.44	0.097	02
"	3724.507	15.08	0.112	36	"	4085.487	15.13	0.018	45	115	3395.513	14.79	0.483	01
"	" .664	16.23	0.269	33	"	4807.613	14.50	0.031	28	"	3412.504	14.69	0.509	16
"	4036.555	14.57	0.491	20	105	3400.521	14.79	....	..	"	3413.503	14.41	0.480	44
"	4074.589	15.08	0.066	12	"	4074.589	15.18	....	..	"	3721.510	14.41	0.033	18
"	4078.579	15.13	0.060	23	"	4085.561	15.13	....	..	"	3724.664	14.79	0.102	R
"	4080.486	14.69	0.468	14	"	4140.478	15.18	....	..	"	4084.540	15.54	0.115	12
"	" .570	15.08	0.053	25	"	4807.613	15.18	....	..	"	4085.487	14.69	0.034	09
"	4084.540	14.69	0.028	12	106	3399.520	15.28	0.051	10	116	3386.535	15.13	0.066	04
"	4085.487	14.57	0.476	01	"	3724.507	14.79	0.013	09	"	3389.545	15.18	0.502	38
"	" .561	14.98	0.050	17	"	4084.540	14.79	0.002	06	"	3721.641	14.79	0.043	01
"	4438.541	16.82	0.403	10	107	3400.521	15.13	0.064	23	"	4080.486	15.49	0.080	20
"	4807.613	16.27	0.367	43	"	3747.564	15.28	0.041	08	"	4084.540	14.46	0.015	04
"	4839.521	16.49	0.309	13	"	4807.613	14.98	0.108	71	"	4085.561	14.50	0.007	03
"	" .563	16.23	0.351	46	108	3389.545	14.79	0.028	07	117	3395.513	15.70	0.142	R
"	" .604	16.49	0.392	22	"	3399.520	15.28	0.130	35	"	3413.503	15.49	0.116	34
"	4841.537	16.23	0.327	42	"	3413.503	14.98	0.084	24	"	3692.651	15.28	0.022	04
"	4842.489	16.66	0.280	08	"	3693.525	14.74	0.038	15	"	3694.533	15.70	0.103	02
97	3412.504	15.70	0.031	29	"	3694.533	14.74	0.007	03	"	3721.510	14.98	0.056	37
"	3721.641	15.28	0.045	15	"	3724.664	14.79	0.000	02	"	3724.507	15.13	0.051	20
"	4074.589	15.49	0.501	10	"	3747.564	14.69	0.038	20	"	4074.589	15.49	0.030	22
98	3413.503	15.44	....	..	"	4078.579	15.28	0.063	18	"	4080.486	15.70	0.522	73
"	4036.555	14.74	....	..	"	4080.570	14.69	0.495	15	"	" .570	15.49	0.005	26
99	3378.520	15.54	....	..	"	4807.613	15.28	0.088	01	"	4438.541	15.18	0.067	21
"	3395.513	15.18	....	..	109	3399.520	14.79	0.002	05	119	3378.520	16.51	0.425	19
"	3724.507	15.54	....	..	"	4078.579	15.44	0.449	130	"	3380.551	16.66	0.385	04
"	" .664	15.44	....	..	"	4084.540	15.08	0.003	24	"	3389.545	14.74	0.059	21
"	4078.579	15.32	....	..	"	4438.541	14.84	0.015	02	"	3390.524	15.54	0.002	133
"	4085.487	15.29	....	..	110	3390.524	15.08	0.004	38	"	3395.513	16.66	0.332	04
100	3390.524	15.80	0.022	18	"	3397.535	15.08	0.045	24	"	3399.520	16.24	0.196	14
"	3395.513	15.44	0.545	14	"	3724.507	15.39	0.520	35	"	3400.521	16.27	0.162	10
"	3400.521	15.54	0.530	10	"	3747.564	15.13	0.524	22	"	3724.507	14.47	0.030	16
"	3721.641	15.44	0.132	73	"	4074.589	14.89	0.516	29	"	" .664	16.00	0.187	33
"	4036.555	15.44	0.227	114	"	4080.486	15.18	0.516	01	"	4036.555	16.66	0.387	04
"	4080.486	15.44	0.061	36	"	4140.478	15.08	0.462	132	"	4074.589	15.49	0.106	15

No.	J. D.	Magn.	Phase	Res.	No.	J. D.	Magn.	Phase	Res.	No.	J. D.	Magn.	Phase	Res.
	d.		d.			d.		d.			d.		d.	
119	4078.579	14.95	0.472	*168*	121	4080.486	15.54	0.151	R	131	4074.589	15.32	0.076	18
"	4080.486	16.66	0.308	*01*	123	3378.520	14.98	0.020	03	"	4078.579	15.44	0.131	*07*
"	" .570	16.70	0.392	00	"	3390.524	15.13	0.024	17	"	4080.570	15.08	0.373	*65*
"	4084.540	16.51	0.220	04	"	3395.513	15.85	0.104	*02*	"	4084.540	15.66	0.408	60
"	4085.487	15.66	0.131	*06*	"	3413.503	15.28	0.094	*38*	132	3395.513	14.84	0.474	*77*
"	" .561	16.51	0.205	09	"	3721.641	15.13	0.053	*05*	"	4078.579	15.54	0.069	26
"	4438.541	14.74	0.073	00	"	4074.589	15.85	0.095	15	"	4080.570	15.18	0.033	16
"	4807.613	14.99	0.500	*02*	"	4080.486	14.79	0.537	*12*	"	4438.541	15.54	0.309	R
"	4839.521	16.66	0.307	*01*	"	4085.487	15.70	0.084	16	133	4078.579	14.84	0.515	*05*
"	" .563	16.79	0.349	09	"	4140.478	14.98	0.530	04	134	3386.535	15.08	0.064	*29*
"	" .604	16.82	0.390	12	"	4807.613	14.74	0.034	*29*	135	3386.535	14.41	....	..
"	4841.537	16.66	0.252	08	125	3389.545	15.32	0.023	*01*	"	3390.524	14.46	....	..
"	4842.489	16.23	0.168	01	"	3721.510	15.44	0.081	*20*	"	3413.503	14.69	....	..
120	3413.503	15.70	....	..	"	3724.664	15.18	0.002	*12*	"	4074.589	14.69	....	..
"	4074.589	15.70	....	..	"	4084.540	15.29	0.492	*19*	"	4078.579	14.69	....	..
"	4140.478	15.49	....	..	128	3747.564	15.18	0.069	*03*	"	4080.570	14.79	....	..
121	3389.545	14.84	0.452	R	"	4036.555	14.79	0.012	*21*	"	4084.540	15.08	....	..
"	3395.513	15.08	0.010	23	129	3389.545	14.69	....	..	136	3386.535	14.46	....	..
"	3397.535	15.08	0.060	*01*	"	4074.589	15.08	....	..	"	4078.579	14.69	....	..
"	3399.520	15.18	0.073	*04*	130	3390.524	14.84	....	..	"	4080.486	14.79	....	..
"	3724.507	14.84	0.146	R	"	3395.513	14.98	....	..	"	4084.540	15.18	....	..
"	3747.564	14.69	0.031	*22*	"	4084.540	15.28	....	..	137	3386.535	14.74	0.050	*34*
"	4074.589	15.08	0.170	*124*	131	3399.520	15.18	0.044	17	"	3390.524	14.79	0.577	15

Table X contains additional observations of the variables, when near maximum, on 40 A and X plates. In a few cases, where the period was doubtful, the variables have been measured on these plates, when they were not near maximum. The first column gives the number of the variable, and the second column, the Julian Date of the observation. The third, fourth, and fifth columns contain the magnitude, the phase, and the corresponding residual from the smooth curve, as in Table IX. All the explanations in regard to magnitudes, phases, and residuals, given on page 13 for Table IX, apply equally well to the corresponding quantities in Table X.

As stated above, whenever the residuals of the variables, given in Tables IX and X, were 0.40, or greater, the corresponding stars were remeasured. The results of these remeasurements will be found in Table XI. The first column gives the number of the variable, and the second column, the Julian Day and thousandths. The third column contains the magnitudes derived from the remeasures. In making these remeasurements, the magnitude was estimated directly without the use of grades, by comparison with the known magnitudes of the comparison stars. The fourth column gives the residual derived from the original measure, taken from the third column of Table IX, or the fifth column of Table X. The fifth column contains the corresponding residual from the magnitude given in the third column of the present table. The sixth column gives the difference, expressed in hundredths of a magnitude, between the magnitudes obtained by the two measurements. The quantity in the sixth column should therefore be equal to that in the fifth, less that in the fourth column, except for the accidental error in reading the residuals from the curve, which in extreme cases may amount to several hundredths of a magnitude. The seventh column gives the result of a third examination of those photographs on which the two measurements of a star differed by 0.40, or more. In this column 1 denotes that the first, and 2, that the second measure was considered more nearly correct. The letter D indicates that the comparison was for some reason difficult, and hence doubtful. This may be due to defects or other causes, and, in such cases, the observation should perhaps have been omitted. In some cases, no remeasurement was made and dots therefore are inserted in the third, fifth, and sixth columns.

TABLE XI

REMEASUREMENTS OF THE VARIABLES

No.	J. D.	Magn.	Res.	Res.	Diff.	R.	No.	J. D.	Magn.	Res.	Res.	Diff.	R.
	d.							d.					
3	4079.493	16.00	*45*	*56*	*11*	D	13	4078.492	16.00	40	70	31	..
"	4437.550	16.66	208	200	*08*	..	"	5161.864	15.50	*46*	10	58	2
5	3664.674	15.70	*41*	*51*	*10*	..	14	3389.545	15.10	*40*	*43*	*03*	..
"	4079.493	16.70	44	44	00	..	"	4067.520	16.50	61	60	01	..
"	5160.843	14.80	59	10	*49*	2	"	4077.581	15.30	57	38	*19*	..
6	3389.545	14.60	*46*	*65*	*19*	..	"	4840.523	15.25	46	71	26	D
"	4077.581	16.10	*61*	*74*	*13*	..	15	3384.514	15.10	*42*	*44*	*03*	..
"	4841.472	15.28	51	51	*01*	..	"	4073.585	15.90	77	80	05	..
7	3397.535	14.50	*56*	*58*	00	..	"	5160.788	15.40	50	20	*30*	..
"	3399.520	14.98	*52*	*03*	48	D_2	"	" .822	15.85	*40*	20	57	2
"	3691.533	14.70	*88*	*66*	20	D	"	5161.864	15.70	54	24	*30*	..
"	4067.520	15.00	52	55	02	..	17	3721.641	15.70	*55*	*12*	42	D_2
"	4079.493	15.85	88	105	15	D	"	4073.585	15.65	43	53	11	..
"	4456.575	14.98	42	*32*	*72*	2	"	4077.492	16.00	*107*	*78*	30	..
9	3378.520	14.50	43	*22*	*63*	2	"	4807.613	15.30	*49*	*37*	12	..
"	4036.555	15.30	72	70	*02*	..	"	4841.472	15.40	*76*	*80*	*14*	..
"	4067.520	16.25	48	50	02	..	"	5160.788	16.50	41	68	27	..
"	4140.478	15.25	*72*	*58*	12	..	18	4078.492	16.66	43	43	00	..
"	5160.800	16.12	52	62	12	..	"	4079.493	16.65	47	63	16	..
10	3664.674	15.79	78	26	*53*	2	"	4084.540	15.30	41	27	*14*	..
"	4036.555	15.10	*55*	56	02	..	"	4841.472	15.10	49	10	*39*	..
"	4073.585	14.95	*58*	*38*	16	..	19	3383.513	16.50	100	90	*10*	..
"	4085.487	16.82	*152*	12	164	2	"	4839.480	15.70	*46*	*60*	*10*	..
11	3380.551	16.49	*47*	*08*	38	..	"	4841.503	16.50	46	60	14	..
"	3395.513	15.45	*51*	*54*	*04*	..	"	" .571	16.45	40	*15*	53	D_1
"	3400.521	14.90	*50*	*23*	27	..	"	5161.799	16.20	90	44	*46*	2
"	4077.492	14.98	49	54	06	..	"	" .828	16.50	46	53	09	..
"	" .581	16.45	61	93	34	..	20	3372.527	16.82	235	220	*12*	..
"	4080.570	15.28	40	50	10	..	"	3384.514	15.85	*46*	*15*	31	..
"	4084.540	14.70	*103*	*90*	13	..	"	3692.540	15.28	*68*	*58*	10	..
"	4085.561	14.70	*75*	52	20	..	"	4456.502	16.50	49	58	09	..
"	4437.550	15.00	68	55	*13*	..	"	4839.480	15.80	*118*	*91*	26	..
"	4841.472	16.00	50	37	*11*	..	"	4841.571	15.00	54	09	*44*	D_2
"	4842.489	15.85	48	21	*26*	..	"	" .603	16.00	62	75	15	D
"	5160.741	16.85	*47*	25	74	2	22	3377.517	14.98	140	58	*82*	2
"	" .779	15.25	*47*	38	12	..	"	3691.533	15.25	*46*	*75*	*29*	..
"	5161.799	15.10	*68*	*55*	18	..	"	4841.571	15.50	*51*	55	04	..
"	" .808	14.50	*42*	*17*	27	..	"	5161.756	15.28	66	37	*26*	..
13	3372.527	16.10	*48*	50	*01*	..	23	3692.540	16.35	68	70	04	..
"	3691.533	14.95	*41*	*15*	26	..	"	4071.577	15.10	*56*	*74*	*18*	..
"	4071.577	15.00	*48*	*25*	26	..	"	4077.581	15.20	*43*	*73*	*29*	..

No.	J. D.	Magn.	Res.	Res.	Diff.	R.	No.	J. D.	Magn.	Res.	Res.	Diff.	R.
	d.							d.					
23	4078.492	16.10	137	143	10	D	34	4067.520	..	48	..	..	D
"	4080.486	15.00	47	60	13	..	"	4073.585	16.05	43	38	06	..
"	4140.478	15.15	88	87	02	..	"	4079.579	15.00	44	60	18	..
"	4456.502	15.85	63	16	46	2	"	4839.480	15.65	77	53	25	..
"	" .575	16.50	42	55	14	..	"	4841.603	16.10	30	10	20	..
24	3390.524	14.98	47	01	46	2	"	5160.853	16.55	71	75	01	..
"	3691.533	15.28	47	46	01	..	35	4456.502	15.70	65	44	21	..
"	" .643	14.75	53	59	04	..	"	5161.735	15.85	48	60	15	..
"	3693.611	15.28	43	10	54	2	"	" .756	15.80	48	28	20	..
"	4839.480	..	54	..	..	D	36	4073.585	14.95	56	32	21	..
"	5160.830	16.00	40	55	10	..	"	4078.492	14.95	56	45	11	..
"	5161.786	16.10	40	02	44	2	"	4079.579	14.95	52	64	13	..
25	3377.517	16.00	60	70	10	..	"	4456.575	16.50	140	120	20	..
"	3389.545	15.10	82	90	08	..	38	4067.520	16.75	172	165	07	..
"	3721.510	15.70	78	95	16	..	"	4078.492	16.25	51	50	02	..
"	4079.493	14.50	56	70	19	..	"	4079.493	15.65	47	37	09	..
"	4841.603	15.10	48	40	08	..	"	" .579	16.25	44	42	02	..
26	3377.517	15.50	54	26	30	..	"	4456.502	16.50	60	45	16	..
"	5161.808	15.10	51	20	31	..	39	3372.527	15.25	66	62	03	..
"	" .820	15.10	53	38	15	..	"	4073.585	15.65	42	35	05	..
27	3384.514	15.75	41	18	26	..	"	4080.570	14.95	48	27	23	..
"	3691.533	16.50	40	13	27	..	"	4841.472	15.30	52	26	24	..
"	3692.540	15.28	91	77	15	..	"	" .503	15.85	52	51	00	..
28	4067.520	16.05	60	25	35	D	"	" .571	16.25	47	22	24	..
"	4073.585	15.28	86	90	04	..	"	" .830	14.45	44	38	04	..
"	4079.579	16.10	41	36	01	..	40	3692.540	15.85	63	62	00	..
"	4437.550	15.75	81	55	26	..	"	3693.611	15.35	86	80	07	..
"	5160.853	15.25	40	05	33	..	"	4437.550	15.10	42	39	03	..
31	4036.555	..	94	..	..	D	"	4841.503	16.40	46	20	26	..
"	4840.523	..	47	..	..	D	41	3383.513	15.50	72	18	56	D_2
"	4841.472	..	66	..	..	D	"	3384.514	15.28	92	26	66	D_2
"	" .503	..	59	..	..	D	"	3399.520	15.50	62	30	32	..
"	" .571	..	86	..	..	D	"	3724.507	15.10	44	10	34	..
32	3372.527	15.85	135	120	15	D	"	4077.492	16.20	62	47	14	..
"	3377.517	15.10	92	75	18	D	"	4078.492	15.30	48	80	130	2
"	3692.540	14.90	53	30	23	..	"	4079.493	14.60	51	72	19	..
"	4071.577	14.98	55	24	30	..	"	4438.541	15.00	50	60	08	..
"	4079.493	15.35	65	72	07	D	"	4456.502	14.98	51	30	19	..
"	4456.575	15.50	55	77	20	D	"	4840.523	16.50	40	34	10	..
"	5161.764	14.50	70	98	29	D	"	4841.503	16.25	70	40	35	..
33	3724.664	16.80	211	23	234	2	"	" .571	15.65	54	65	11	..
"	4078.492	15.30	78	03	86	2	"	5160.741	16.50	130	120	10	..
"	4079.493	15.00	41	25	18	..	"	5161.713	16.40	102	104	01	..
"	4080.486	14.75	48	50	04	..	"	" .722	16.45	56	65	09	..
34	3397.535	15.50	42	48	06	..	"	" .756	16.50	42	22	20	..

No.	J. D.	Magn.	Res.	Res.	Diff.	R.	No.	J. D.	Magn.	Res.	Res.	Diff.	R.
	d.							d.					
42	3377.517	16.75	58	27	29	..	49	5161.786	16.23	41	23	17	..
"	3691.533	16.00	72	52	20	D	50	3384.514	16.10	50	40	10	..
"	" .643	16.00	47	63	16	D	"	4073.585	15.28	166	147	20	..
"	3724.507	15.90	70	34	36	D	"	4085.487	15.28	48	49	00	..
"	4073.585	14.45	49	35	14	..	"	4456.502	15.35	41	26	14	..
"	4437.550	16.50	48	05	44	2	51	3384.514	16.50	48	50	01	..
"	4840.523	16.50	46	66	19	..	"	3397.535	15.20	54	62	08	..
"	4841.472	14.95	58	45	13	..	"	4073.585	16.20	60	25	35	..
"	" .503	14.55	59	33	24	..	52	3397.535	14.40	54	60	06	..
43	3377.517	15.10	55	43	08	D	"	4067.520	14.75	48	25	23	..
"	3384.514	15.50	63	67	06	D	"	4071.577	15.35	119	110	07	..
"	3397.535	14.98	41	30	10	..	"	5160.853	15.60	46	80	32	..
"	4078.492	14.50	59	76	19	..	"	5161.840	16.00	43	41	00	..
"	4084.540	14.98	42	25	20	..	53	3694.655	14.85	59	45	13	..
"	4438.541	14.60	45	03	48	2	"	4085.487	15.28	48	49	00	..
"	5160.741	16.20	98	100	04	D	54	3691.643	15.75	46	22	25	..
"	5161.713	15.00	50	34	18	..	"	4067.520	16.25	42	23	19	..
"	" .722	14.50	45	12	58	2	"	4071.577	16.00	65	49	15	..
"	" .820	15.10	53	05	56	2	55	3694.533	14.50	61	62	00	..
44	3399.520	15.28	66	82	16	..	"	4456.575	16.25	45	22	24	..
"	3691.643	15.70	46	47	04	..	"	4841.603	15.60	52	63	11	..
"	3724.507	14.40	40	32	09	..	56	3664.674	15.15	55	68	13	..
"	5160.779	16.00	66	10	56	D2	"	3691.533	15.75	53	49	05	..
45	3399.520	15.25	40	32	07	..	"	4077.581	16.00	63	33	30	..
"	4071.577	15.25	57	42	17	..	"	4079.579	15.50	75	68	06	..
"	4077.581	16.00	50	50	00	..	"	4084.540	15.30	68	82	14	..
"	4079.579	16.45	40	43	04	..	"	4841.472	15.65	69	58	11	..
"	4841.472	15.70	82	80	00	..	"	" .603	16.25	46	37	11	..
46	3389.545	15.65	41	05	36	..	"	5160.843	15.75	40	45	05	..
"	4074.589	15.75	87	55	31	..	57	3691.533	16.25	60	42	19	D
"	4077.581	16.20	62	48	14	..	"	3692.540	16.25	72	39	35	D
"	4079.493	15.85	65	33	31	..	"	4073.585	16.45	47	33	15	..
"	5160.853	15.70	71	20	51	2	"	4841.503	16.25	46	12	35	..
47	3664.674	16.00	47	03	46	2	58	3377.517	16.00	54	30	24	..
"	4074.589	14.80	56	46	06	..	"	3384.514	15.85	106	82	21	..
"	4456.575	15.28	55	32	26	..	"	3664.674	15.10	50	42	08	..
"	5161.713	16.00	45	10	34	..	"	3692.540	14.55	48	05	53	2
48	3377.517	15.25	52	25	29	..	"	3724.664	15.00	52	02	54	2
"	4077.581	15.28	46	05	52	2	"	4036.555	15.28	70	35	36	..
"	4080.570	15.35	55	65	09	..	"	4071.577	16.25	80	10	71	2
"	4841.571	15.28	41	22	16	..	"	4437.550	15.10	59	14	70	2
49	4078.492	16.25	41	07	35	..	"	4456.502	16.10	52	22	30	..
"	4080.570	15.30	53	28	24	..	"	4841.503	16.00	46	36	10	..
"	4085.487	15.35	63	43	19	..	"	5160.830	16.25	46	11	35	..
"	4841.472	15.30	52	37	14	..	59	4840.523	16.00	84	38	46	D2

No.	J. D.	Magn.	Res.	Res.	Diff.	R.	No.	J. D.	Magn.	Res.	Res.	Diff.	R.
	d.							d.					
60	3372.527	15.70	46	03	42	2	68	3386.535	15.20	54	80	24	..
"	4071.577	15.00	53	70	18	..	"	3664.674	15.65	75	54	21	..
"	4456.575	16.00	45	18	23	..	"	3691.533	16.45	46	55	09	..
61	3389.545	14.95	45	58	13	D	"	" .643	15.35	64	82	19	..
"	3400.521	15.35	95	73	22	D	"	3692.540	16.15	71	60	16	..
"	3412.504	15.00	116	110	02	D	"	3693.525	15.70	52	64	16	D
"	3413.503	14.50	69	96	29	..	"	4067.520	16.00	71	15	56	2
"	3691.643	14.45	43	43	01	..	"	4077.492	15.35	113	85	27	..
"	3692.651	14.95	43	20	23	D	"	4437.550	16.40	94	123	29	..
"	4841.472	15.75	56	34	21	..	"	4807.613	14.55	67	55	09	..
"	5160.741	15.25	43	15	29	..	"	4839.480	16.55	81	70	11	..
"	5161.722	14.60	43	14	58	D2	"	4841.472	15.30	46	28	14	..
"	" .786	15.25	72	11	61	D2	"	" .571	15.50	40	45	04	..
"	" .808	16.00	45	55	10	..	"	5160.800	14.65	41	50	09	..
"	" .820	16.00	57	40	16	D	"	" .822	14.95	43	44	03	..
62	3383.513	16.25	41	32	09	..	"	5161.713	16.10	48	108	56	2
"	3691.643	15.25	68	18	87	D2	"	" .722	16.00	40	102	61	2
"	4437.550	16.00	50	05	46	D2	69	3693.611	15.50	95	64	32	D
"	4841.472	16.10	64	35	30	..	"	" .654	15.15	137	137	02	D
"	5160.843	16.10	65	34	31	..	"	4067.520	16.20	48	60	14	..
63	3372.527	..	45	..	..	D	"	4073.585	14.95	51	35	16	..
"	3384.514	15.85	50	05	41	2	"	4077.492	16.15	46	37	09	..
"	3692.540	15.10	72	80	08	..	"	4437.550	16.70	53	63	10	..
"	3724.507	15.25	54	23	29	..	"	4456.575	16.50	54	42	10	..
"	4080.486	14.95	64	06	59	2	"	4841.472	16.00	48	62	15	..
"	5160.830	14.40	42	46	06	..	"	" .503	16.20	47	54	09	..
64	3377.517	15.00	42	03	44	2	"	5160.843	15.75	47	63	15	D
"	3397.535	14.75	51	61	09	..	71	3691.533	16.25	43	08	35	..
"	3664.674	16.10	44	24	20	..	"	4067.520	15.50	79	16	56	2
"	4077.492	15.85	42	20	21	..	"	4078.492	15.25	92	10	81	2
"	4841.503	15.00	44	00	44	2	"	4079.579	15.35	52	30	19	..
"	5161.808	14.95	52	08	59	2	"	4437.550	15.00	45	00	44	2
"	" .840	15.25	47	05	41	D2	"	4839.480	15.25	95	17	111	D2
65	3397.535	14.95	41	37	03	..	"	4840.523	15.15	174	20	155	D2
"	4084.540	14.85	60	02	59	2	"	5160.741	16.60	52	42	10	..
66	3399.520	15.15	46	60	13	..	"	5161.713	15.10	55	17	39	..
"	4078.492	15.00	89	115	28	..	"	" .744	14.45	43	65	24	..
"	4841.472	15.25	45	20	24	..	"	" .756	14.55	45	68	24	..
67	3413.503	14.50	46	02	48	2	"	" .764	14.75	51	60	09	..
"	4071.577	15.70	82	97	15	..	"	" .777	15.00	72	52	21	..
"	4078.492	15.30	75	78	02	..	72	3377.517	16.60	49	30	19	..
"	4079.579	15.30	41	42	02	..	"	3378.520	15.30	72	60	14	..
"	4839.480	15.25	54	58	03	..	"	3399.520	15.00	67	57	08	..
68	3377.517	16.70	50	53	04	..	"	4078.579	14.50	76	100	24	..
"	3383.513	15.75	100	85	15	..	"	4079.493	14.65	61	65	04	..

No.	J. D.	Magn.	Res.	Res.	Diff.	R.	No.	J. D.	Magn.	Res.	Res.	Diff.	R.
	d.							d.					
72	4080.486	15.10	45	38	08	..	79	4036.555	15.00	61	68	08	..
"	4841.603	14.50	52	36	14	..	"	4078.492	15.75	54	59	05	..
"	5161.764	15.25	44	25	19	..	"	" .579	15.70	43	70	26	..
74	3389.545	14.95	42	30	11	..	"	4079.493	14.55	43	57	14	..
"	3390.524	14.75	42	44	01	..	"	4140.478	15.70	57	74	16	..
"	3664.674	15.35	40	15	27	..	"	4839.480	16.80	55	30	24	..
"	5160.779	15.25	36	17	19	..	"	5160.741	15.30	85	110	24	..
"	" .800	15.70	49	32	15	..	"	" .788	16.00	46	53	06	..
"	5161.799	15.70	52	16	36	..	80	3694.655	15.70	56	40	16	..
76	4067.520	15.35	67	60	09	..	"	4840.523	15.10	44	08	34	..
"	4071.577	15.85	44	43	00	..	81	4067.520	16.50	90	40	48	2
"	4073.585	16.00	43	55	15	..	82	4077.581	16.50	68	84	14	..
"	4079.493	14.90	50	20	30	..	"	5161.722	16.10	56	26	26	..
"	" .579	15.35	57	43	14	..	83	3664.674	15.30	85	70	14	..
"	5160.853	14.85	60	25	35	..	84	4067.520	15.50	42	42	01	..
"	5161.713	16.75	41	01	39	..	"	4071.577	15.05	130	138	13	..
77	3377.517	14.85	64	03	59	2	"	4077.492	16.25	44	35	09	..
"	3400.521	14.60	52	61	09	..	"	4839.480	15.70	52	50	10	..
"	3692.651	14.55	60	51	09	..	"	4841.472	15.85	64	29	36	..
"	3693.611	15.30	51	37	12	..	86	3386.535	15.70	110	70	38	..
"	3694.533	15.00	64	72	08	..	"	4077.581	15.50	41	12	30	..
"	4067.520	16.25	62	45	16	..	"	4437.550	15.15	45	43	02	..
"	4077.581	15.65	52	50	02	..	"	4456.502	15.75	43	63	21	..
"	4078.492	15.25	79	23	55	2	"	4841.472	15.75	97	71	26	..
"	4079.493	16.25	50	04	45	2	"	5161.808	16.25	48	60	09	..
"	4438.541	14.70	51	03	48	2	"	" .828	15.70	43	60	16	..
"	4841.472	15.70	67	45	20	..	88	3372.527	15.70	58	37	21	..
"	5160.741	16.40	94	75	20	..	"	3384.514	15.75	41	47	05	..
78	3384.514	15.65	42	47	05	..	"	3390.524	15.00	75	88	13	D
"	3691.643	15.00	44	57	13	..	"	3691.533	15.28	72	70	03	D
"	4071.577	15.25	56	62	07	..	"	" .643	15.75	55	29	26	D
"	4077.492	16.00	67	52	15	..	"	3692.540	15.25	54	50	03	D
"	" .581	14.90	47	64	18	..	"	4067.520	15.00	59	57	05	..
"	4079.493	15.65	119	113	05	..	"	4077.581	15.25	71	79	07	D
"	" .579	16.10	79	92	10	..	"	4078.492	15.50	41	62	22	D
"	4437.550	15.25	60	12	55	2	"	4079.493	15.25	74	77	03	D
"	4456.502	14.95	48	01	49	D2	"	4456.502	14.75	138	132	06	..
"	4807.613	14.60	58	72	14	..	"	4839.480	16.25	51	53	02	..
"	4839.480	15.50	87	87	01	D	"	4841.472	16.50	41	67	27	..
"	4841.472	16.40	58	47	09	..	"	" .571	15.70	50	28	21	..
"	5160.830	14.95	40	13	26	..	"	" .603	16.00	73	02	72	D2
79	3372.527	16.05	75	65	11	..	89	4077.492	15.30	136	134	02	..
"	3384.514	16.20	50	43	08	..	"	4839.480	15.70	49	47	00	..
"	3692.540	15.85	51	07	56	2	"	4840.523	14.90	54	33	18	..
"	3724.664	15.05	142	155	13	..	91	3691.533	16.5	156	..	..	D

No.	J. D.	Magn.	Res.	Res.	Diff.	R.	No.	J. D.	Magn.	Res.	Res.	Diff.	R.
	d.							d.					
91	3691.643	15.00	*111*	*80*	31	..	101	3377.517	16.50	42	26	*16*	..
"	3724.507	14.85	*74*	*85*	*13*	..	"	4078.492	15.85	42	57	15	..
"	4067.520	15.80	79	37	*43*	D2	"	4841.472	16.25	73	99	25	D
"	4077.492	15.30	*160*	*125*	32	..	104	3691.643	14.40	*65*	*62*	04	D
"	4079.579	16.00	*105*	*76*	30	..	"	4073.585	15.85	44	28	*15*	..
"	4840.523	15.30	*19*	*02*	17	..	"	4085.487	15.00	45	33	*13*	..
"	5160.779	16.15	44	40	04	..	106	3691.643	16.00	107	106	00	..
"	" .830	16.15	47	12	*34*	..	"	4067.520	15.85	*77*	*77*	00	..
"	5161.713	16.00	*61*	*72*	*11*	..	"	5160.788	16.10	*54*	*50*	04	..
"	" .722	16.20	*65*	*45*	20	..	"	5161.873	16.15	*44*	*52*	*08*	..
"	" .735	15.65	*55*	*75*	*20*	..	107	3384.514	15.35	*46*	*65*	*19*	..
92	4036.555	..	*155*	..	..	D	"	4079.493	15.15	*44*	*57*	*13*	..
"	4077.492	16.00	50	82	30	..	"	4807.613	15.00	*71*	*70*	02	..
"	4078.492	16.00	59	90	30	..	"	4841.472	16.25	106	131	25	..
"	4079.493	15.70	64	64	00	..	"	" .503	15.70	56	70	16	..
"	4456.575	16.00	42	72	30	..	"	5161.764	14.90	*42*	*24*	16	..
93	3692.540	15.35	43	28	*14*	..	"	" .873	16.50	55	57	01	..
"	4840.523	15.35	45	31	*14*	..	108	4067.520	16.00	*73*	*74*	00	..
"	4841.603	16.00	*68*	*70*	00	D	"	4077.581	16.10	71	70	*01*	..
94	3384.514	16.25	86	85	02	..	"	4079.493	15.15	*154*	*150*	*03*	..
"	3664.674	16.75	52	45	*07*	..	"	4437.550	14.75	41	02	*38*	..
"	3691.533	15.70	*41*	*20*	21	..	"	5160.853	14.40	*41*	*33*	09	..
"	3747.564	15.30	*52*	*51*	02	..	109	3692.540	16.25	*55*	*51*	04	D
"	4067.520	16.05	67	72	05	..	"	4073.585	16.25	*109*	37	71	D2
"	4071.577	15.20	*140*	*146*	*08*	..	"	4077.581	14.50	*59*	*48*	09	..
"	4077.492	16.00	50	27	*23*	..	"	4078.579	15.75	*130*	*98*	31	..
"	4079.579	16.15	40	55	15	..	110	3691.533	15.60	*87*	*70*	16	..
"	4080.486	15.15	*122*	*138*	*13*	..	"	3692.540	15.25	*59*	*87*	*29*	..
96	3691.533	15.15	*41*	*21*	23	..	"	4079.493	16.00	88	106	20	..
"	4807.613	16.25	*43*	*45*	*02*	..	"	4140.478	15.15	*132*	*125*	07	..
"	4839.563	16.35	*46*	*34*	12	..	"	4437.550	15.70	60	78	16	..
"	4841.537	16.40	*42*	*26*	17	..	"	4841.472	16.60	70	37	*34*	..
"	" .603	16.40	*48*	*32*	17	..	"	5161.828	16.00	59	26	*31*	..
"	5160.741	16.80	*47*	09	57	2	111	3377.517	16.50	*43*	27	70	D2
97	4067.520	16.15	67	71	04	..	"	3383.513	15.15	53	23	*29*	..
100	3664.674	15.85	*46*	*17*	31	..	"	3386.535	15.15	*52*	*45*	07	..
"	3721.641	15.25	*73*	*93*	*19*	..	"	3691.533	15.70	*66*	*48*	16	D
"	4036.555	15.85	*114*	*72*	41	D	"	4036.555	..	*143*	..	..	D
"	4077.492	15.70	*118*	*90*	26	..	"	4071.577	16.05	69	32	*36*	..
"	" .581	16.00	91	23	*70*	2	"	4073.585	16.25	62	97	35	..
"	4080.570	15.35	*73*	*92*	*19*	..	"	4077.581	16.25	61	45	*16*	..
"	4437.550	16.10	*57*	*37*	20	..	"	4079.579	16.30	*42*	*05*	36	..
"	4456.575	16.50	76	55	*20*	..	"	4085.487	15.15	*91*	*108*	*17*	..
"	4839.480	16.55	52	47	*05*	..	"	5160.741	16.75	55	37	*19*	..
"	4840.523	16.00	*61*	*66*	*06*	..	"	" .830	15.25	42	25	*19*	..

No.	J. D.	Magn.	Res.	Res.	Diff.	R.	No.	J. D.	Magn.	Res.	Res.	Diff.	R.
	d.							d.					
111	5161.828	15.55	47	45	01	..	121	4074.589	15.20	124	113	12	..
113	3691.533	15.00	64	60	02	..	"	4077.492	16.25	69	52	16	..
"	" .643	16.25	56	42	14	..	"	4080.486	16.15	63	02	61	2
"	4067.520	14.85	53	47	06	..	"	4456.575	16.00	88	97	10	..
"	4071.577	16.25	66	75	09	..	"	4841.472	16.00	47	48	01	..
"	4437.550	16.25	86	60	25	..	"	5160.741	16.75	123	55	69	D2
"	5160.853	16.50	47	75	27	..	"	5161.713	16.50	53	42	10	..
"	5161.864	16.25	68	92	25	..	"	" .722	16.65	44	50	05	..
"	" .873	16.25	62	80	14	..	"	" .735	16.50	41	22	20	..
114	3378.520	16.00	54	08	46	2	123	4079.493	16.15	75	53	21	..
"	4073.585	15.75	40	50	09	..	125	3691.533	16.15	65	35	30	..
"	4079.579	15.75	86	40	49	2	"	3692.540	16.25	62	22	40	D2
"	4140.478	15.15	41	12	29	..	"	4067.520	16.00	46	37	10	..
115	3377.517	15.70	65	55	10	..	"	4456.575	16.15	49	32	17	..
"	3413.503	14.50	44	35	09	..	"	4840.523	16.00	68	68	02	..
"	3724.664	15.70	43	47	91	D2	126	3377.517	16.00	57	02	56	2
"	4073.585	15.30	82	60	22	..	"	3384.514	15.85	72	32	41	2
"	4077.581	16.50	46	27	19	..	"	3692.540	16.00	41	26	15	..
"	4840.523	16.75	47	02	44	2	"	4067.520	16.00	53	23	30	..
"	4841.472	16.75	43	02	44	D2	"	4078.492	16.25	71	21	93	D2
"	" .603	15.00	193	173	21	D	"	4079.579	16.25	42	13	55	2
116	3389.545	15.25	38	45	07	..	"	5161.735	16.20	57	75	20	..
"	4841.472	15.75	44	68	25	..	"	" .764	16.25	43	58	14	..
117	3372.527	16.00	69	58	11	..	128	3692.540	16.00	46	37	10	..
"	3384.514	16.25	42	57	14	..	"	4071.577	..	90	..	..	D
"	3395.513	16.10	41	00	40	2	"	4073.585	..	58	..	..	D
"	4077.492	15.30	70	90	19	..	"	4077.492	15.35	106	115	09	..
"	4079.493	16.30	49	28	19	..	"	4079.493	15.30	102	57	46	D2
"	4080.486	15.60	73	85	10	..	"	4437.550	15.30	106	120	14	..
"	4456.575	..	49	..	..	D	"	4456.502	15.50	42	47	06	..
"	5160.843	16.25	55	42	11	..	"	4840.523	..	141	..	..	D
"	" .853	16.25	57	59	02	..	"	5160.741	16.25	64	51	11	..
118	4071.577	16.25	62	65	02	..	"	5161.756	16.35	54	50	06	..
"	4073.585	16.30	65	60	06	..	"	" .764	16.15	59	50	06	..
"	4077.492	15.30	46	48	02	..	"	" .786	15.50	57	22	35	..
"	" .581	16.30	65	60	06	..	"	" .864	15.30	100	23	76	D2
119	3390.524	15.35	133	113	19	..	131	3377.517	15.80	70	44	26	..
"	4078.579	15.25	168	139	30	..	"	4067.520	15.00	55	10	44	2
121	3372.527	16.00	67	48	20	..	"	4071.577	16.00	67	54	11	..
"	3384.514	16.50	43	04	39	..	"	4073.585	15.85	55	32	21	..
"	3389.545	15.30	91	46	44	2	"	4077.492	15.75	44	30	12	..
"	3691.533	15.70	43	80	36	..	"	4079.493	15.25	63	55	07	..
"	3692.540	15.75	99	78	21	..	"	" .579	15.70	68	56	11	..
"	3724.507	16.00	126	12	116	2	"	4080.570	15.00	65	73	08	..
"	4071.577	16.25	69	52	16	..	"	4084.540	15.75	60	67	09	..

No.	J. D.	Magn.	Res.	Res.	Diff.	R.	No.	J. D.	Magn.	Res.	Res.	Diff.	R.
	d.							d.					
131	4437.550	15.00	*65*	*74*	*08*	..	132	4438.541	16.00	*82*	*36*	46	D2
"	4456.502	15.70	*75*	*58*	16	..	"	4456.575	15.25	*40*	*33*	07	..
"	4839.480	16.15	*76*	*15*	61	2	"	4840.523	16.25	139	134	*06*	D
"	4840.523	16.25	119	127	09	..	"	4841.503	..	80	..	..	D
"	5160.741	16.25	46	12	*35*	..	"	5160.741	16.25	118	126	09	..
"	5161.764	16.15	46	40	*06*	..	"	" .822	15.75	45	12	*31*	..
132	3383.513	16.20	53	42	*11*	..	"	5161.713	15.90	48	80	36	..
"	3395.513	15.00	*77*	*60*	16	..	"	" .820	16.25	70	77	09	..
"	3691.533	15.30	*50*	*28*	22	..	"	" .850	16.10	43	35	*06*	..
"	3692.540	15.00	*41*	*50*	*08*	..	"	" .873	16.40	41	48	09	..
"	4067.520	16.25	43	27	*16*	..	133	5160.741	16.75	40	12	*29*	..
"	4077.581	14.90	*59*	*50*	11	..	134	4456.502	15.80	*63*	*32*	31	D
"	4078.492	15.75	41	62	21	..	137	3691.533	16.25	*75*	*35*	40	D2
"	4079.493	16.20	*52*	50	102	2	"	3692.540	16.00	*74*	*28*	46	D2
"	4437.550	16.00	*47*	*37*	10	..	"	4079.493	15.35	44	61	17	..

CHAPTER III

THE ELEMENTS OF THE VARIABLES

THE periods of many of the variables in Messier 3 appear to be uniform, the returns of maximum occurring with perfect regularity so far as is shown by the observations already obtained, which cover several thousand periods. The Julian Date of any return of maximum can therefore be obtained by the use of the simple formula, J. D. = A + p E, where J. D. is the date of any desired return of maximum, A, the principal epoch of maximum, p, the period, and E, the number of periods since A. In some cases, however, there is evidence of periodic oscillations in the times of maximum, which indicate periodic changes in the length of the period. This manifests itself by alternately accelerated and retarded returns of maximum at relatively long but regular intervals. This systematic deviation from a simple period can in some cases be represented by a sine term in the formula of the star's changes.

Variable 94 is a good example of those stars which appear to be thus affected by a secular variation in the length of the period. This star is well situated for measurement. It is reasonably near the comparison stars and is so distant from the centre of the cluster that its light is not confused with that of other stars. The range of variation in brightness is large. The observations, also, are fairly well distributed in time, so that the determination of the correct period, if it were uniform, ought to present few difficulties. No uniform period has been found, however, which satisfies all the observations, and an examination of the measures appears to show a systematic oscillation in the times of returning maximum, such as would be caused by a periodic change in the length of the period. Somewhat similar discordances have been noted in a few cases, which were due to small errors in the periods, but in the present case no better period has been found, though sought for with special care. Large differences in the duration of the exposures account for certain large residuals from the smooth curve drawn through all the measurements, but the excessively large residuals in the present case cannot be accounted for in this way. The results obtained by the use of the best uniform period which was found, using the formula, J. D. 2415021.118 + $0^d.52370$ E, are shown graphically in Plate III, Fig. 1. As will be seen readily by this diagram, the

amount of the discordance, which will be caused by a given oscillation in the period, depends much on the phase at which the observation occurs. Observations at minimum would not in general be rendered discordant by a considerable change in phase, while those which occur when the light is rapidly changing will be made extremely discordant by even a small change. This is obvious from the form of the light curve which is extremely inclined just before maximum and nearly flat at minimum. The observations best suited to the determination of systematic differences between the computed and the observed returns of maximum are evidently those which occur at phases where the light changes most rapidly. The observations of this star are 57 in number. Of these, 18 show the star at magnitudes between 14.90 and 16.40, where the changes in brightness are most rapid. Table XII contains, for these 18 observations, in the first column the Julian Date, in the second column the corresponding magnitude of the variable, and in the third column, the phase computed from the period $0^d.52370$. The fourth column contains the corrections in time, expressed in thousandths of a day, which must be applied to the phases to make the observations coincide with the smooth curve drawn through all the observations, shown in Plate III, Fig. 1. These corrections were then plotted as ordinates, with Julian Dates as abscissas. In drawing a curve through points thus plotted special weight was given to the corrections indicated by those observations just preceding maximum, where the change of light is most

TABLE XII

VARIABLE 94. CORRECTIONS TO PHASE. PERIOD $0^d.52370$

J. D.	Magn.	Phase	Correction	J. D.	Magn.	Phase	Correction	J. D.	Magn.	Phase	Correction
d.		d.	d.	d.		d.	d.	d.		d.	d.
3384.514	16.23	.483	−.019	3747.564	15.28	.085	−.028	4080.486	15.28	.457	+.029
3691.533	15.49	.090	−.021	4067.520	16.00	.060	+.037	" .570	14.98	.018	+.020
3693.568	14.98	.030	+.008	4071.577	15.28	.451	+.035	4839.480	15.70	.086	−.006
" .611	15.13	.070	−.022	4077.492	16.23	.082	+.033	4840.523	15.70	.082	−.002
3694.655	15.44	.069	−.004	4078.492	15.28	.034	+.023	4841.503	15.08	.015	+.029
3724.507	15.32	.071	−.013	4079.579	16.00	.074	+.023	" .571	15.70	.083	−.002

rapid, since these corrections must be precisely satisfied by the curve. These values have therefore been indicated by crosses in the graphical representation of these results, Plate II, Fig. 1, while ordinary corrections have been indicated by dark circles. The two observations at J. D. 2413664.674 and J. D. 2414456.502, although they represent the star at minimum brightness, are also important. They involve

large residuals and should have corrections of at least −.018 and −.013, respectively. With larger corrections the observations would be almost as accordant. These corrections have been indicated in the figure by arrows. It appears that a sine curve satisfies these observations better than any other. For this star, it is well expressed in the form $0^d.03 \sin (0°.1924\,E + 272°.3)$, and the complete formula for the variable, for the returns of maximum, becomes J. D. $2415021.118 + 0^d.52370\,E + 0^d.03 \sin (0°.1924\,E + 272°.3)$. For dates preceding J. D. 2415021, E must be regarded as negative. The results obtained by the use of this formula are shown graphically in Plate III, Fig. 2.

TABLE XIII

VARIABLE 94. PERIODIC VARIATION

J. D.	Magn.	Phase	Corr. Phase	Res.	Res.	J. D.	Magn.	Phase	Corr. Phase	Res.	Res.
d.		d.	d.			d.		d.	d.		
3372.527	14.50	0.017	0.004	*23*	*16*	4840.523	15.70	0.082	0.095	*04*	*07*
3377.517	16.66	0.294	0.280	23	21	4841.472	14.79	0.508	0.521	00	14
3383.513	14.79	0.005	0.514	13	13	" .503	15.08	0.015	0.028	35	16
3384.514	16.23	0.483	0.467	86	00	" .571	15.70	0.083	0.096	*06*	*07*
3664.674	16.82	0.463	0.441	52	*06*	5160.779	16.98	0.357	0.375	08	10
3691.533	15.49	0.090	0.072	*41*	05	" .788	16.94	0.366	0.384	04	06
" .643	16.49	0.200	0.182	*25*	*16*	" .800	16.82	0.378	0.396	*08*	*06*
3692.540	14.79	0.049	0.031	*36*	*15*	" .809	16.94	0.387	0.405	04	06
3693.525	14.79	0.511	0.494	06	*07*	" .822	16.70	0.400	0.418	*20*	*18*
" .568	14.98	0.030	0.013	10	25	" .830	16.82	0.408	0.426	*08*	*06*
" .611	15.13	0.070	0.056	*38*	*10*	" .843	16.82	0.421	0.439	*08*	*06*
3694.655	15.44	0.069	0.052	*06*	26	" .853	16.94	0.431	0.449	05	12
3724.507	15.32	0.071	0.059	*19*	04	5161.713	16.82	0.244	0.262	*04*	*03*
3747.564	15.28	0.085	0.077	*52*	*25*	" .722	16.98	0.253	0.271	11	12
4036.555	14.79	0.517	0.023	12	*04*	" .735	16.82	0.266	0.284	*06*	*05*
4067.520	16.00	0.060	0.089	67	29	" .744	16.94	0.275	0.293	05	07
4071.577	15.28	0.451	0.480	*140*	*08*	" .756	16.82	0.287	0.305	*07*	*06*
4073.585	16.82	0.364	0.393	*08*	*06*	" .764	16.98	0.295	0.313	08	10
4077.492	16.23	0.082	0.111	50	15	" .777	16.82	0.308	0.326	*08*	*06*
" .581	16.82	0.171	0.200	19	10	" .786	16.82	0.317	0.335	*08*	*06*
4078.492	15.28	0.034	0.063	35	*04*	" .799	16.94	0.330	0.348	04	06
4079.493	14.79	0.512	0.017	07	01	" .808	16.82	0.339	0.357	*08*	*06*
" .579	16.00	0.074	0.103	40	05	" .820	16.82	0.351	0.369	*08*	*06*
4080.486	15.28	0.457	0.486	*122*	11	" .828	16.82	0.359	0.377	*08*	*06*
" .570	14.98	0.018	0.047	22	*15*	" .840	16.82	0.371	0.389	*08*	*06*
4437.550	16.94	0.358	0.330	04	06	" .850	16.82	0.381	0.399	*08*	*06*
4456.502	16.82	0.457	0.428	32	*06*	" .864	16.94	0.395	0.413	04	06
" .575	14.79	0.006	0.501	12	03	" .873	16.98	0.404	0.422	08	10
4839.480	15.70	0.086	0.099	*11*	*17*						

In Table XIII are shown the results obtained by the use of the two periods. The first column gives the Julian Date of the observation, and the second column, the corresponding magnitude of the variable. The third column gives the phase derived from the use of the simple period $0^d.52370$, and the fourth column, the phase when the sine term explained above is added. The fifth and sixth columns give the corresponding residuals. The first, second, third, and fifth columns are taken from Tables IX and X. The mean residual, in the case of the simple period, from the smooth curve is ± 0.218, and of the corrected period, ± 0.096 magn. The largest residual in the former case is 1.40, and in the latter case, 0.29 magn.

Variable No. 79 presents peculiarities which appear in no other star in the cluster, so far as known, though others may exist. The uniform period which best satisfies the observations appears to be $0^d.48388$, which involves large discordances. The period $0^d.48285$, however, serves well for all the observations between J. D. 2413372 and J. D. 2414100. The observations between these dates were plotted from the formula J. D. $2415021.049 + 0^d.48285\,E$ and a smooth curve was drawn through them. The additional observations were then plotted in the same diagram. There were 56 observations of this star, 16 of which were of magnitude 16.00, or brighter, and fairly suitable for the determination of corrections to the phases, which were read from the smooth curve as in the case of Variable 94, given above. The results are given in Table XIV, which is of the same form as Table XII.

TABLE XIV

VARIABLE 79. CORRECTIONS TO PHASE. PERIOD $0^d.48285$

J. D.	Magn.	Phase	Correction	J. D.	Magn.	Phase	Correction
d.		*d.*	*d.*	*d.*		*d.*	*d.*
3377.517	15.44	0.089	−.013	4079.493	14.69	0.001	.000
3390.524	14.84	0.059	−.032	" .579	15.44	0.087	− .011
3724.664	15.18	0.066	−.007	4140.478	15.54	0.146	− .059
4036.555	15.08	0.036	+.009	4437.550	15.13	0.266	− .290
4067.520	15.80	0.099	+.017	4438.541	14.64	0.291	− .291
4077.581	15.13	0.020	+.028	4456.502	15.08	0.387	− .342
4078.492	15.80	0.448	.000	4841.603	14.79	0.174	− .657
" .579	15.44	0.052	+.026	5160.741	15.54	0.148	−1.026

The values of the corrections thus obtained, and given in the fourth column of Table XIV, were then plotted and a smooth curve drawn through them. This curve is shown graphically in Plate II, Fig. 2. The heavy horizontal and inclined

straight lines shown in the figure appear to satisfy the observations most naturally and precisely. This implies a period of $0^d.48285$ for the early, and of $0^d.48329$ for the late, observations, and a somewhat sudden change from the former to the latter period at about J. D. 2414118. It should be noted, however, that corrections differing from those in Table XIV can also be assumed, since the addition or subtraction of the star's full period to the values there given always furnishes a correction which will answer equally well for the observation immediately concerned. It is therefore possible that some other curve would better represent the changes which are actually taking place; but, whatever the nature of the underlying physical causes may be, the assumption of the change in period from $0^d.48285$ to $0^d.48329$ at J. D. 2414118 satisfies all the observations within the probable errors of measurement. Plate III, Fig. 3, gives a graphical representation of the results obtained by the use of the uniform period, $0^d.48388$, and Plate III, Fig. 4, the results obtained by the use of the corrected periods given above. The mean residual from the smooth curve in the first case is 0.27, and in the second case, 0.12. The maximum residual in the first case is -1.42, and in the second case, -0.58.

The elements of the variables, determined for the most part from the values in Tables IX and X, are contained in Table XV. The first column gives the number of the variable. The second and third columns give the rectangular coordinates from the centre of the cluster, expressed in seconds of arc, and the fourth column, the approximate distance of the variable from the centre, expressed in minutes, and tenths, of arc. The quantities in the second and third columns are taken from H.A. **38**, page 238, and are repeated here for the convenience of the reader. The fifth, sixth, and seventh columns give the magnitude at maximum, the magnitude at minimum, and the range of variation. These values are derived in each case from smooth curves drawn through all the observations, and are mean results based on the assumption that the range of variation is uniform. The maximum brightness of many of the variables is doubtless somewhat greater than is indicated in Table XV, since the duration of the maximum phase, if indeed there is any duration of the maximum brightness, is often less than the time of the photographic exposure, especially on the X plates. It is evident in such cases that the measured photographic magnitude cannot equal the true brightness at the instant of maximum. This difference between the measured and the true magnitude will become greater as the ratio of the time of exposure to the period of the star increases. The eighth, ninth, tenth, and eleventh columns give the approximate duration of maximum, minimum, increase, and decrease, expressed in percentages. Two dots in these columns indicate that the phase in question has no duration

or that no period was found for the star. It is often difficult to determine whether the light is constant for a considerable time at minimum, or whether it slowly decreases until increase begins. Too great precision must not be looked for in these values. The twelfth and thirteenth columns give the maximum rates of increase and decrease in the light, expressed in magnitudes per hour. These values were read from tangents to the smooth curves drawn through the observations. These quantities are expressed only to tenths of a magnitude, except in those cases in which the time of the increase was covered by one or both series of K plates, on J. D. 2415160 and 2415161. In such cases a much more accurate determination of the rate of increase is possible than when these observations occur at other phases. Plots were then made on a larger scale and the values derived are given in the table expressed to hundredths of a magnitude. The rate of increase in many cases is thus found to be very great, amounting to six magnitudes per hour in a few stars. The fourteenth column contains the principal epoch, which is, in all cases, the Julian Date of the first computed maximum after Greenwich Mean Noon, January 1, 1900. The fifteenth column contains the period, expressed in the decimal part of a day, and the sixteenth column, the same period, expressed in hours, minutes, and seconds. When a study of the observations appears to indicate the need of a correction to the simple period given in the fifteenth column, the letter R is added and additional information will be found in the remarks following the table. No variable yet found in Messier 3 has a period as long as one day. All the variables appear to belong to Class IV, Subclass a, or " Cluster Variables," according to the classification given in H.A. 38, page 132. The number of periods, or returns of maximum of the variable between the dates of the first and last plates included in this discussion is given in the seventeenth column. The first plate was made on J. D. 2413372, and the last, on J. D. 2415161. The last column contains the average deviation of the observations from the smooth curve drawn through them, using the simple period in all cases.

TABLE XV

ELEMENTS OF THE VARIABLES

No.	X	Y	Dist.	Magnitude			Duration				Incr.	Decr.	Epoch	Period	Period			No. Periods	A.D.
				Max.	Min.	Range	Max.	Min.	Incr.	Decr.									
	″	″	′										d.	d.	h.	m.	s.		
1	− 5.2	−128.5	2.1	14.50	16.67	2.17	..	42	12	46	3.6	0.5	5021.379	0.52065	12	29	44.2	3436	10
2	+ 15.8	+ 52.6	0.9	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
3	+ 57.9	− 66.0	1.4	14.50	16.70	2.20	..	27	16	57	1.7	0.5	5021.228	0.55906R	13	25	2.8	3201	18
4	− 43.5	− 8.8	0.7	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
5	+261.0	− 22.3	4.4	14.35	16.75	2.40	..	38	9	53	2.73	0.5	5021.238	0.50587	12	8	27.2	3538	12
6	−123.9	+ 60.1	2.3	14.40	16.85	2.45	..	30	12	58	5.50	0.6	5021.452	0.51433	12	20	38.1	3479	17
7	− 4.8	+ 87.2	1.5	14.40	16.48	2.08	..	36	12	52	5.84	0.7	5021.074	0.49743	11	56	18.0	3597	15
8	− 81.7	− 23.4	1.5	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
9	−291.4	−207.8	6.0	14.60	16.76	2.16	..	43	11	46	3.94	0.5	5021.111	0.54157	12	59	51.6	3304	15
10	+153.6	+138.0	3.5	14.75	16.70	1.95	..	54	11	35	2.9	0.5	5021.270	0.56950	13	40	4.8	3142	11
11	−152.6	−209.7	4.3	14.30	16.60	2.30	..	49	10	41	4.60	0.5	5021.142	0.50790	12	11	22.6	3523	22
12	− 3.8	−145.4	2.4	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
13	− 26.0	−137.5	2.3	14.50	16.60	2.10	..	31	11	58	3.45	0.4	5021.322	0.48307	11	35	37.2	3704	15
14	− 49.0	−161.0	2.5	14.50	16.55	2.05	..	37	18	45	0.6	0.5	5021.426	0.63478	15	14	5.0	2819	15
15	− 90.8	−273.2	4.8	14.50	16.60	2.10	..	41	10	49	4.12	0.5	5021.299	0.53008	12	43	18.9	3376	19
16	−301.4	− 93.1	5.2	14.70	16.85	2.15	..	24	21	55	1.4	0.4	5021.410	0.51149	12	16	32.7	3498	13
17	+142.4	−440.4	7.7	15.00	16.78	1.78	..	41	14	45	2.35	0.5	5021.267	0.57612	13	55	17.2	3106	16
18	+ 97.6	−295.3	5.2	15.00	16.77	1.77	..	33	13	54	2.5	0.4	5021.142	0.51633	12	23	30.9	3465	13
19	+350.5	−245.6	7.1	15.60	16.82	1.22	..	44	15	41	2.8	0.5	5021.333	0.41172	9	52	52.6	4346	20
20	+333.5	−271.6	7.2	14.45	16.78	2.33	..	29	14	57	5.48	0.4	5021.314	0.49129R	11	47	26.6	3643	25
21	+346.9	+ 17.9	5.8	14.90	16.90	2.00	..	33	13	54	2.6	0.5	5021.477	0.51646	12	23	42.1	3464	11
22	+190.2	− 10.7	3.2	14.35	16.90	2.55	..	27	17	56	2.78	0.7	5021.200	0.48146	11	33	16.4	3717	14
23	−113.0	+279.2	5.1	14.50	16.02	1.52	..	37	13	50	3.4	0.2	5021.130	0.59777	14	20	47.3	2993	21
24	−147.6	+ 10.4	2.5	14.80	16.60	1.80	..	48	12	40	2.75	0.3	5021.333	0.66458	15	56	59.7	2692	16
25	−124.4	− 31.4	2.2	14.64	16.74	2.10	..	33	19	48	1.7	0.9	5021.089	0.47990	11	31	3.4	3729	19
26	−177.4	− 43.0	3.1	14.50	16.60	2.10	..	37	20	43	0.9	0.5	5021.239	0.59775	14	20	45.6	2994	18
27	−110.2	−102.8	2.5	15.00	16.68	1.68	..	45	20	35	0.8	0.5	5021.360	0.58006	13	53	56.0	3085	13
28	− 25.0	−105.8	1.8	14.50	16.30	1.80	..	42	12	46	..	0.7	5021.410	0.47566	11	24	57.0	3762	16
29	− 65.2	− 73.6	1.6	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
30	− 36.5	+ 58.0	1.2	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
31	+ 33.1	+ 65.1	1.3	14.50	16.56	2.06	..	45	13	42	2.9	0.7	5021.542	0.58074	13	56	15.9	3081	17
32	+ 11.8	+ 60.1	1.0	14.35	16.60	2.25	..	42	14	44	5.72	0.7	5021.123	0.49536R	11	53	17.8	3613	24
33	+ 70.5	− 89.0	1.9	14.70	16.76	2.06	..	36	15	49	2.7	0.6	5021.217	0.52523	12	36	19.9	3406	12
34	+135.4	+170.2	3.6	15.00	16.70	1.70	..	36	13	51	..	0.5	5021.136	0.55909	13	25	5.4	3200	17
35	−107.3	−278.2	4.9	14.65	16.67	2.02	..	51	11	38	1.0	0.6	5021.015	0.53070	12	44	12.5	3372	16
36	+172.0	− 35.4	3.0	14.80	16.82	2.02	..	42	15	43	5.0	0.6	5021.293	0.54557R	13	5	37.2	3280	16
37	−236.7	+164.7	4.8	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
38	−203.0	+127.7	4.0	14.80	16.83	2.03	..	41	9	50	4.2	0.5	5021.298	0.56102	13	27	52.1	3189	17
39	−243.6	+121.4	4.6	14.60	16.73	2.13	..	37	15	48	1.6	0.4	5021.069	0.58709	14	4	0.8	3046	17
40	−271.2	+112.4	4.9	14.70	16.83	2.13	..	44	12	44	2.3	0.6	5021.420	0.55240	13	15	27.4	3239	16
41	− 93.3	+ 54.0	1.8	15.00	16.75	1.75	..	54	17	29	..	..	5021.264	0.48568	11	39	22.8	3684	24
42	− 78.6	+ 41.0	1.5	14.20	16.73	2.53	..	29	12	59	3.0	0.4	5021.515	0.59022	14	9	55.0	3032	17
43	+ 99.9	+ 24.7	1.7	14.60	16.64	2.04	..	28	17	55	1.6	0.5	5021.191	0.54051	12	58	20.1	3311	22
44	+170.0	+ 99.4	3.3	14.70	16.68	1.98	..	34	23	43	1.3	0.6	5021.368	0.50640	12	9	13.0	3534	14
45	−241.2	−129.9	4.6	14.80	16.90	2.10	..	37	11	52	2.8	0.5	5021.342	0.53687	12	53	5.6	3333	17

No.	X	Y	Dist.	Magnitude			Duration				Incr.	Decr.	Epoch	Period	Period			No. Periods	A.D.
				Max.	Min.	Range	Max.	Min.	Incr.	Decr.									
	″	″	′										d.	d.	h.	m.	s.		
46	−128.1	− 51.5	2.3	15.40	16.70	1.30	..	51	13	36	..	0.3	5021.264	0.61230	14	41	42.7	2922	15
47	−117.5	− 73.2	2.3	14.80	16.93	2.13	..	20	30	50	0.8	0.4	5021.459	0.54103	12	59	5.0	3307	15
48	+126.9	−102.7	2.7	15.00	16.63	1.63	..	35	22	43	0.6	0.3	5021.103	0.62780	15	4	1.9	2860	16
49	+140.0	−100.7	2.9	14.76	16.76	2.00	..	46	14	40	1.7	0.6	5021.256	0.54821	13	9	25.3	3264	17
50	+ 8.8	−234.0	3.9	14.70	16.76	2.06	..	49	10	41	3.3	0.8	5021.345	0.51310R	12	18	51.8	3487	14
51	+ 30.8	−226.4	3.8	15.00	16.70	1.70	..	41	21	38	..	0.4	5021.486	0.58399	14	0	56.7	3064	16
52	− 76.8	+152.0	2.9	14.50	16.48	1.98	..	50	12	38	1.7	0.6	5021.486	0.51622	12	23	21.4	3456	16
53	− 7.4	+122.8	2.0	14.34	16.60	2.26	..	43	8	49	4.94	0.7	5021.006	0.50489	12	7	2.5	3545	12
54	− 32.6	+106.4	1.9	14.40	16.50	2.10	..	50	10	40	3.6	0.6	5021.178	0.50156	12	2	14.8	3568	12
55	−204.2	+324.4	6.4	14.50	16.77	2.27	..	19	10	71	3.2	0.3	5021.392	0.53057	12	44	1.2	3372	12
56	−141.1	+358.6	6.5	14.90	16.38	1.48	..	22	22	56	..	..	5021.048	0.49545	11	53	26.9	3612	23
57	+155.2	− 0.2	2.6	14.64	16.74	2.10	..	51	10	39	3.4	0.5	5021.399	0.51297	12	18	40.6	3488	16
58	− 86.2	+ 46.2	1.6	14.60	16.37	1.77	..	35	23	42	..	..	5021.002	0.51671	12	24	3.7	3463	21
59	−109.8	−228.4	4.2	14.85	16.77	1.92	..	44	12	44	2.1	0.4	5021.332	0.58881	14	7	53.2	3039	11
60	−297.4	−315.4	7.2	15.00	16.76	1.76	..	34	15	51	1.3	0.3	5021.389	0.70772	16	59	7.0	2528	13
61	+190.2	+363.0	6.8	14.74	16.66	1.92	..	42	16	42	..	..	5021.064	0.52095	12	30	10.1	3435	24
62	+ 90.2	+417.0	7.2	15.25	16.59	1.34	..	46	23	31	..	..	5021.331	0.65241	15	39	28.2	2743	14
63	+ 37.2	+341.9	5.7	14.80	16.62	1.82	..	51	10	39	2.94	0.5	5021.094	0.57042	13	41	24.3	3137	16
64	+114.8	+330.4	5.8	15.00	16.63	1.63	..	36	18	46	1.06	0.4	5021.324	0.60546	14	31	51.7	2956	13
65	+125.4	+327.5	5.9	14.50	16.60	2.10	..	36	10	54	3.38	0.4	5021.503	0.66834	16	2	24.6	2677	11
66	−101.4	+121.4	2.6	15.00	16.46	1.46	..	48	16	36	..	..	5021.333	0.62024	14	53	8.7	2886	15
67	−131.4	+123.0	3.0	14.50	16.70	2.20	..	48	12	40	3.72	0.8	5021.411	0.56837	13	38	27.2	3148	16
68	+ 21.9	+174.8	2.9	14.88	16.22	1.34	..	42	25	33	..	..	5021.030	0.51920	12	27	38.9	3446	32
69	+ 80.6	+141.0	2.7	15.00	16.67	1.67	..	42	19	39	1.2	0.5	5021.553	0.56660	13	35	54.2	3158	19
70	+ 37.6	+152.2	2.6	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
71	+160.6	− 2.0	2.7	14.90	16.67	1.77	..	40	20	40	1.4	0.5	5021.168	0.54904	13	10	37.1	3259	20
72	+445.5	− 2.2	7.4	14.40	16.90	2.50	..	39	11	50	6.38	0.9	5021.327	0.456075	10	56	44.9	3924	19
73	+438.5	+ 62.2	7.4	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
74	+ 88.2	+151.0	2.9	14.75	16.80	2.05	..	45	10	45	5.0	0.6	5021.452	0.49215	11	48	41.8	3636	20
75	+ 49.0	+159.5	2.8	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
76	− 14.4	− 88.2	1.5	14.24	16.77	2.53	..	32	8	60	3.78	0.6	5021.293	0.50175	12	2	31.2	3567	18
77	− 94.4	+ 27.8	1.7	14.60	16.90	2.30	..	33	17	50	1.9	0.7	5021.451	0.45934	11	1	27.0	3895	20
78	+ 47.5	+ 66.4	1.4	14.43	16.52	2.09	..	49	18	33	1.6	0.6	5021.248	0.61192	14	41	9.9	2924	23
79	+ 43.4	+349.4	5.8	14.90	16.68	1.78	..	25	13	62	1.8	0.4	5021.149	0.48388	11	36	47.2	3698	27
80	+416.8	+284.6	8.3	14.74	16.70	1.96	..	37	15	48	4.0	0.4	5021.242	0.53934	12	56	39.0	3317	15
81	+342.8	+351.1	8.2	14.77	16.77	2.00	..	42	13	45	2.8	0.5	5021.325	0.52910	12	41	54.2	3382	10
82	−102.6	−601.8	10.1	14.86	16.88	2.02	..	38	22	40	2.3	0.9	5021.331	0.52526	12	36	22.4	3407	13
83	−441.6	+113.4	7.6	14.53	16.82	2.25	..	32	12	56	6.40	0.5	5021.045	0.501245	12	1	47.6	3569	12
84	+ 64.0	+165.2	3.0	14.83	16.60	1.77	..	40	13	47	1.45	0.7	5021.248	0.59573	14	17	51.1	3004	17
85	+306.2	+225.8	6.4	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
86	+513.0	−114.2	8.8	15.04	16.58	1.54	..	37	12	51	1.72	0.6	5021.016	0.41420	9	56	26.9	4320	19
87	+110.6	+ 60.2	2.1	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
88	− 35.0	− 70.2	1.3	14.67	16.07	1.40	..	58	11	31	2.63	0.4	5021.188	0.65418	15	42	1.2	2736	25
89	+ 28.0	−110.8	1.9	14.47	16.65	2.18	..	33	13	54	3.09	0.5	5021.507	0.54848	13	9	48.7	3262	16
90	+ 97.2	−188.2	3.5	14.63	16.67	2.04	..	42	13	45	2.4	0.6	5021.461	0.51703	12	24	31.4	3461	09
91	− 14.3	−550.0	9.2	14.75	16.74	1.99	..	38	15	47	2.07	0.8	5021.270	0.53018	12	43	28.4	3375	23
92	− 29.0	−408.4	6.8	14.77	16.86	2.09	..	48	12	40	2.3	0.8	5021.073	0.50355	12	5	6.7	3553	16
93	−319.4	−396.6	8.5	15.03	16.70	1.67	..	52	21	27	1.9	0.8	5021.232	0.60232	14	27	20.4	2971	11
94	−488.4	−224.6	8.9	14.65	16.89	2.24	..	41	13	46	2.3	0.7	5021.118	0.52370R	12	34	7.7	3416	22
95	−154.7	+ 15.4	2.6	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..

No.	X	Y	Dist.	Magnitude			Duration				Incr.	Decr.	Epoch	Period	Period			No. Periods	A.D.
				Max.	Min.	Range	Max.	Min.	Incr.	Decr.					h.	m.	s.		
	"	"	′										d.	d.					
96	−164.2	−234.0	4.7	14.35	16.72	2.37	..	40	10	50	5.42	0.5	5021.019	0.49947	11	59	14.2	3583	13
97	−130.0	−196.7	4.0	15.35	16.40	1.05	..	32	18	50	0.4	0.2	5021.126	0.50428	12	6	9.8	3549	13
98	+132.4	− 3.2	2.2	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
99	+201.8	− 55.0	3.5	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
100	+ 69.9	+ 97.3	2.0	15.53	16.70	1.17	..	38	24	38	0.4	0.2	5021.533	0.55819	13	23	47.6	3206	22
101	+ 46.4	+ 83.7	1.6	15.20	16.47	1.27	..	44	22	34	1.0	0.3	5021.101	0.64387	15	27	10.4	2779	15
102	+ 58.4	+114.9	2.2	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
103	+ 58.1	+120.4	2.2	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
104	− 25.8	+145.5	2.4	14.60	16.70	2.10	..	42	14	44	3.2	0.5	5021.076	0.57084	13	42	0.6	3134	12
105	− 20.9	+191.6	3.2	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
106	− 48.0	+168.0	2.9	14.35	16.70	2.35	..	47	13	40	1.82	0.5	5021.311	0.54718R	13	7	56.4	3270	15
107	− 75.8	+335.0	5.7	14.95	16.38	1.43	..	42	16	42	2.3	0.3	5021.291	0.44725	10	44	2.4	4001	22
108	−219.0	+310.9	6.3	14.75	16.73	1.98	..	50	8	42	6.48	0.6	5021.083	0.519607R	12	28	14.0	3443	16
109	− 89.3	+ 2.7	1.5	14.83	16.77	1.94	..	36	15	49	2.0	0.4	5021.033	0.53392	12	48	50.7	3351	19
110	− 99.4	− 15.8	1.7	14.70	16.45	1.75	..	52	11	37	2.91	0.5	5021.397	0.53612	12	52	0.8	3338	23
111	− 92.7	+ 21.9	1.6	14.83	16.43	1.60	..	47	14	39	0.89	0.4	5021.401	0.51265	12	18	13.0	3491	33
112	−144.6	−719.4	12.2	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
113	+199.8	−689.8	12.0	14.50	16.87	2.37	..	58	11	31	3.92	0.7	5021.446	0.51791	12	25	47.4	3455	24
114	+ 11.8	+622.0	10.4	15.00	16.70	1.70	..	45	13	42	1.8	0.5	5021.499	0.59772	14	20	43.0	2993	11
115	+445.0	+664.7	13.4	14.52	16.77	2.25	..	49	12	39	3.3	0.8	5021.097	0.51409	12	20	17.4	3480	19
116	−491.8	+465.2	11.3	14.45	16.70	2.25	..	25	16	59	1.9	0.6	5021.442	0.51479	12	21	17.9	3476	11
117	+ 89.6	−467.6	7.9	15.23	16.78	1.55	..	40	15	45	..	..	5021.579	0.60052	14	24	44.9	2980	19
118	+144.4	−292.2	5.5	14.70	16.87	2.17	..	42	12	46	3.5	0.4	5021.272	0.49937	11	59	5.6	3583	15
119	+253.4	+106.2	4.6	14.20	16.70	2.50	..	40	10	50	2.91	0.8	5021.466	0.51776	12	25	34.5	3456	13
120	−295.8	+231.4	6.3	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
121	− 43.6	+ 56.1	1.1	14.85	16.58	1.73	..	41	18	41	..	..	5021.056	0.49304	11	49	58.7	3629	28
122	− 33.5	− 46.4	1.0	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
123	−259.	−985.	17.0	14.90	16.90	2.00	..	53	14	33	2.8	0.7	5021.395	0.54545	13	5	26.9	2693	17
124	− 66.4	−201.4	3.6	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
125	+186.3	−132.8	3.8	15.30	16.50	1.20	..	41	26	33	..	..	5021.039	0.53881	12	55	53.2	3321	15
126	− 15.4	−146.4	2.4	15.30	16.25	0.95	..	48	22	30	..	..	5021.389	0.53550	12	51	7.2	3342	18
127	+ 95.6	− 63.6	1.9	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
128	+114.6	+131.4	2.9	15.00	16.50	1.50	..	46	21	33	1.12	0.5	5021.244	0.60597	14	32	35.8	2953	30
129	− 43.6	+ 77.2	1.5	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
130	+ 4.2	+ 84.6	1.4	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
131	− 73.2	+ 27.4	1.3	14.90	16.30	1.40	..	32	18	50	2.73	0.3	5021.051	0.43720	10	29	34.1	4093	28
132	− 53.6	− 22.0	1.0	14.90	16.40	1.50	..	33	8	59	3.4	0.4	5021.386	0.50665	12	9	34.6	3532	33
133	− 58.6	+ 43.5	1.2	14.70	16.70	2.00	..	33	13	54	3.13	0.4	5021.482	0.55074	13	13	3.9	3229	14
134	− 22.4	+ 52.4	1.0	15.20	16.60	1.40	..	42	13	45	1.1	0.3	5021.494	0.61699	14	48	27.9	2900	15
135	− 27.0	+ 38.0	0.8	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
136	− 25.4	+ 33.4	0.7	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
137	+ 53.0	− 18.8	0.9	14.65	16.67	2.02	..	33	8	59	3.76	0.4	5021.155	0.57701	13	50	53.7	3101	12

REMARKS

1. The period given in the table seems to be satisfactory. The period, $0^d.52140$, involving five less returns of maximum between the extreme dates, J.D. 3372 and J.D. 5161, also serves fairly well.
2. This star is near the centre of the cluster and is a difficult object. Its variations in brightness appear to be very small. No attempt has been made to find a period.
3. The period given in the table satisfies fairly well all the observations, except that of J.D. 4437.550, which is very discordant, involving a residual from the smooth

curve of +2.08 magnitudes. A reexamination of the photograph made on that date confirms the original determination of magnitude. By the use of the formula, J.D. 5021.228+0^d.55906 E+0^d.04 sin (0°.134 E+209°.1), the large residual at J.D. 4437.550 is made to disappear, and the results from the other observations remain about as accordant as before. This formula, however, has not been used in Tables IX and X, and the single large residual at J.D. 4437.550 may be due to some other cause. This variable has a companion, position 295°, distance 4″, magnitude 14.5.

4. This star is near the centre of the cluster and its image is close to those of other stars. It is rather bright and appears to vary through a small range. It is a difficult object, and no attempt has been made to find a period.
5. The elements of this star appear to be fairly satisfactory.
6. The elements of this star appear to be fairly satisfactory.
7. This star has a companion, position 230°, distance 3″, magnitude 15.0. The images of these two components are sometimes confused, so that precise determinations of magnitude are difficult. This may account for a number of large residuals.
8. A difficult object. The variable has a close companion approximately at position 100°, distance 2″, magnitude 15.0. The images of the two stars coalesce on the plates. The measurements do not make the variability sure, and no attempt has been made to determine a period.
9. The elements of this star appear to be fairly satisfactory.
10. The elements of this star appear to be fairly satisfactory.
11. The elements of this star appear to be about right. The period 0^d.50862, involving five less returns of maximum between the extreme dates, serves nearly as well. It is probable that a sine term in the formula would improve the accordance of the results.
12. This star is undoubtedly variable, but the range is not large and the determination of the period is difficult. The period appears to be about 0^d.47, but no period has been found which satisfies all the observations.
13. The elements given in the table appear to be satisfactory. The extremely rapid increase of brightness is well shown on the plates of J.D. 4841 and J.D. 5161.
14. The elements of this star appear to be satisfactory. The period 0^d.63591, involving five less returns of maximum between the extreme dates, answers nearly as well.
15. The period given in the table satisfies the observations fairly well. The rapidity of the increase in brightness is well shown on the plates of J.D. 5161.
16. The elements of this star appear to be satisfactory. The duration of the minimum phase seems to be exceptionally short.
17. The period given in the table appears to be about right, although a few of the residuals are large, especially that at J.D. 4077.492.
18. The elements of this star appear to be satisfactory.
19. This star is somewhat distant from the comparison stars. The period given in the table, which is the shortest found in the cluster, appears to be about right, although there are several large residuals from the smooth curve.
20. This variable is rather distant from the comparison stars. The period given in the table appears to be about right. The increase in brightness is very rapid, as is well shown by the plates made on J.D. 5161. The large residuals near maximum may be due in part to the wide range in the duration of the exposures. There are indications, however, of systematic changes in the period at different epochs, and greater accordance is obtained by the use of the formula, J.D. 5021.314 +0^d.49129 E+0^d.03 sin (0°.074 E+339°.0).
21. The elements of this star appear to be satisfactory.
22. The elements of this star appear to be satisfactory. This is one of the best examples of extremely rapid increase, and rapid decrease in light. See plates of J.D. 5160 and J.D 5161.
23. This star is well situated for measurement, but it is an extremely close double, with components about equal in brightness. The period given in the table may be about right, but the light of both components was measured, since the images coalesce even on the best plates. It is possible that both components are variable, which might account for the large residuals from the smooth curve.
24. The elements of this star appear to be fairly satisfactory. The period, 0^d.66458, is one of the longest in the cluster. The form of the light curve, however, presents no peculiarity.
25. The elements of this star appear to be satisfactory.
26. The elements of this star appear to be satisfactory. The period is somewhat longer, and the increase in brightness somewhat less rapid, than is usual in the stars of this cluster.
27. The period given in the table, 0^d.58006, is probably the correct one, although 0^d.57912, involving five more returns of maximum between the extreme dates, satisfies the observations nearly as well.
28. The elements of this star appear to be about right, although there are several large residuals from the smooth curve.
29. This star is a close double. The light of the components is about equal, but their photographic images are not separated even on the best plates. The variability of one or both components seems sure, but the range is small. The period may be about 0^d.50.
30. This star is close to a brighter one and is a difficult object. The variability seems sure, but no period has been found.
31. The elements of this star appear to be fairly satisfactory.
32. The period given in the table appears to be about right, but there are several large residuals from the mean curve. A more satisfactory accordance is obtained by the use of the formula, J.D. 5021.123+0^d.495345 E +0^d.03 sin (0°.089 E+112°.0). The increase and decrease of brightness are extremely rapid.
33. The elements of this star appear to be satisfactory.
34. The elements of this star appear to be fairly satisfactory.
35. The elements of this star appear to be fairly satisfactory.
36. No uniform period has been found which satisfies all the observations well. The period given in the table,

$0^d.54557$, is the most satisfactory simple period which could be found. Small changes from this period, involving five or ten more or less returns of maximum between the extreme dates, give unfavorable results. The observed times of returning maximum, although they involve large residuals from the mean curve, never vary by a large amount from the computed epochs, but these differences appear to be systematic, such as would be manifested by a periodic change in the length of the period. A good accordance of all the observations may be obtained by the use of the following formula: — J.D. $5021.293+0^d.54557\ E+0^d.02 \sin(0°.246\ E+333°.4)$.

37. No satisfactory period has been found for this star. The variation is sure, although the range is rather small. A period of about $0^d.5$ satisfies many of the observations fairly well.
38. The elements of this star are fairly satisfactory.
39. The period given in the table, $0^d.58709$, is probably correct, but the period $0^d.58612$, involving five more returns of maximum between the extreme dates, is also fairly satisfactory.
40. The elements of this star appear to be satisfactory.
41. The period of this star seems about right, but there are many large residuals from the mean curve. The cause of these discordances is not apparent, but may be due to a small error in the period, or to some irregularities in the star.
42. The elements of this star appear to be fairly satisfactory, although a few of the residuals from the mean curve are large. This star is rather near the centre of the cluster.
43. The elements of this star appear to be fairly satisfactory. This variable is rather near the centre of the cluster.
44. The elements of this star appear to be fairly satisfactory.
45. The elements of this star appear to be fairly satisfactory.
46. The period given in the table satisfies the observations fairly well. The large residual at 4077.581 is confirmed by a reexamination of the image, but may be due to some peculiarity of the plate. The range of variation is small.
47. The elements of this star appear to be fairly satisfactory, although there are a few rather large residuals from the mean curve. The increase in brightness appears to be unusually slow.
48. The elements of this star appear to be fairly satisfactory.
49. The elements of this star appear to be fairly satisfactory.
50. The period given in the table satisfies fairly well all the observations except that of J.D. 4073.585, which does not appear to be an error in measurement. No better simple period has been found, but better accordance is obtained by the use of the following formula: — J.D. $5021.345+0^d.51310\ E+0^d.02 \sin(0°.234\ E+26°.7)$.
51. The elements of this star appear to be fairly satisfactory, although there are several large residuals.
52. The elements of this star appear to be fairly satisfactory.
53. The elements of this star appear to be satisfactory. The rapid increase in brightness is well shown by the observations of J.D. 5160 and J.D. 5161.
54. The elements of this star appear to be fairly satisfactory.
55. The elements of this star appear to be fairly satisfactory.
56. The range of variation of this star is rather small, and the elements given in the table may be regarded as somewhat doubtful. The period, however, is probably approximately right.
57. The elements of this star are probably approximately right.
58. This star has an extremely close, faint companion and is a rather difficult object. The measurements appear to have large accidental errors, as is shown by the observations of J.D. 5160 and J.D. 5161, on which dates the accidental errors are usually small. The period given in the table is evidently about right, although the residuals from the smooth curve are unusually large.
59. The elements of this star appear to be fairly satisfactory.
60. The elements of this star appear to be satisfactory. The period, $0^d.70772$, is longer than that of any other variable in Messier 3 whose period has been determined. The form of the light curve resembles that which was designated Subclass b in the discussion of the variables in the cluster ω Centauri. See H.A. 38, page 132. It is, however, hardly more than an unusual case of Subclass a, a type almost, or quite, universal in Messier 3.
61. The period given in the table is probably about right, although a few of the residuals from the smooth curve are large.
62. The elements of this star appear to be about right, although there are a number of large residuals from the smooth curve. The range of variation is rather small.
63. The elements of this star appear to be fairly satisfactory.
64. The elements of this star appear to be fairly satisfactory. The increase in light seems to be less rapid than is usual in the variables of this cluster.
65. The elements of this star appear to be satisfactory. The length of the period of this variable is surpassed only by that of No. 60, among the variables of this cluster.
66. The elements of this star appear to be about right, although there are several large residuals from the smooth curve.
67. The elements of this star appear to be about right, although there are several large residuals from the smooth curve.
68. The range of variation of this star, although not large, is well marked. The period appears to be not far from $0^d.5$. This is shown on the plates of J.D. 5160 and J.D. 5161, but no period has been found which satisfies all the observations. The period given in the table appears to be about right, but there is some disturbing element, either an error in the period, or, possibly, duplicity with both components variable. The period $0^d.4798$ satisfies fairly well the observations from J.D. 4067 to J.D. 4084, but such a period does not seem consistent with the observations of J.D. 5160 and J.D. 5161.
69. This star is a rather difficult object. The period given is probably about right, although there are several large residuals. The period $0^d.56570$, involving five more returns of maximum between the extreme dates, satisfies the observations about as well as the one given in the table, but neither of them is entirely satisfactory.

70. This star is undoubtedly variable, but the range of variation is so small that the determination of the period from the available materials would be difficult, and has not been attempted.
71. The period given is probably about right. This variable is so near the variable No. 57, that the images of the two stars coalesce on the poorer plates.
72. The period given satisfies nearly all the observations well. A few large residuals may be due to a slight error in the period, or the need of a correction for secular variation. The increase in brightness is extremely rapid, as is well shown on the plates of J.D. 5161.
73. This star appears to vary somewhat. The range, however, is so small that no attempt has been made to determine the elements.
74. The period given satisfies the observations well.
75. The measurements of this star make the variability sure, but the range is so small that the determination of the period, though not impossible, would be very laborious and it has not been attempted.
76. The period given satisfies the observations well. The rapidity of the increase in brightness is shown on the plates of J.D. 5161.
77. This star is near the centre of the cluster and its image on nearly all the plates is confused with those of one or more adjacent very faint stars.
78. This star is near the centre of the cluster and hence somewhat difficult. There are a number of large residuals.
79. The results for this star appear to be of special interest. See the discussion in regard to it on page 58 of this chapter.
80. The results for this star appear to be satisfactory.
81. The results for this star appear to be satisfactory.
82. The results for this star appear to be satisfactory.
83. The results for this star appear to be satisfactory. The rate of the increase in light, as shown on the plates made on J.D. 5160 and J.D. 5161, is extremely rapid.
84. The results for this star appear to be fairly satisfactory.
85. The observations of this star confirm the variability, but the range is small and no attempt has been made to determine the elements.
86. The period, $0^d.41420$, which is one of the shortest found in this cluster, satisfies the observations fairly well.
87. This star appears to vary somewhat, but the range is so small that no attempt has been made to determine the period.
88. This star is near the centre of the cluster, and the measures on most of the plates are difficult. This may account for the many large deviations from the smooth curve, but the period, also, may be somewhat in error.
89. The period given in the table satisfies the observations fairly well, except that of J.D. 4077.492, which is very discordant. A remeasurement of the plate made on that date, however, confirms the original observation.
90. The period given in the table satisfies the observations well.
91. The period given in the table does not satisfy well all the observations. Especial attention has been given to this star, which has been measured on all available plates, 34 in number, in addition to the fifty measurements given in Table IX. The star is distant from the sequence of comparison stars, and the observations of brightness are somewhat difficult on this account. This does not account, however, for the many large residuals, which appear to be systematic. If a correction of $+0^d.06$ is applied to the computed returns of maximum for the observations between J.D. 3664 and J.D. 3724, $-0^d.06$ between J.D. 4067 and J.D. 4085, and $+0^d.02$ for those of J.D. 5160 and J.D. 5161, the results will be rendered reasonably accordant, but no simple mathematical expression appears to represent these corrections.
92. The period given satisfies the observations well, except that of J.D. 4036.555. A re-examination of the image of the variable on that date shows that it is probably defective.
93. The period given satisfies the observations well. The star appears to remain near the maximum brightness longer than is usual with the variables of this cluster, and, at minimum, for nearly half its period.
94. For the peculiarities of this star see the discussion on page 55 of this chapter.
95. This is one of the brightest stars in the cluster, and the brightest variable found. It has a companion, position 265°, distance 6″, magnitude 14.0. The variations in light appear to be peculiar. Usually the star remains at about maximum brightness, when it is noticeably brighter than the close companion given above. Occasionally, however, it is fainter than the companion. The observations indicate that it may be a variable of the Algol type, but for an exact study of this star a series of photographs having short exposures is desirable. No period has been found which satisfies all the observations. Comparisons of this star were first made with the sequence star b, which later showed indications of variability. These measures were therefore rejected, and additional measures were made, making use of sequence stars a, c, and d.
96. The period of this star is so nearly half a day, that it was somewhat difficult to determine whether it was a trifle greater or less that that amount. The period given, $0^d.49947$, about 45^s less than half a day, satisfies the observations well and is doubtless about right. A period of $0^d.50017$, however, about 15^s greater than half a day, involving five less returns of maximum between the extreme dates, is nearly as accordant as the one given above; and even a period of $0^d.50086$, involving ten less returns of maximum between the extreme dates, does not give extremely discordant results. As is well shown on the plates of J.D. 5060 and J.D. 5161, the increase in brightness is extremely rapid, the greater part of the increase from minimum to maximum occupying little more than half an hour.
97. The period given in the table satisfies the observations well, except that at J.D. 4067.520. The range of variation, however, is smaller than is usual in the stars of this cluster, and the form of the light curves appears to be peculiar.

98. It is doubtful if this star is really variable. There are some small apparent variations, but these may be due to differences in the plates and exposures. The star is rather near the centre of the cluster.

99. This star appears to vary somewhat, but the range of variation, if genuine, is very small, and no attempt has been made to determine a period.

100. The period given for this star is not very satisfactory, but it is probably approximately right. There is no apparent reason for so many large residuals from the smooth curve, unless they are caused by an error in the period, or the need of a correction for secular variation.

101. This star is near the centre and the range of variation is comparatively small. The period given satisfies the observations well, however, and is doubtless about right. The period is among the longest found in the cluster.

102. This star is very slightly, if at all, variable. The early comparisons seem to show a small variability, but later measurements do not confirm this.

103. The variability of this star is doubtful. It is similar to No. 102.

104. The period given satisfies the observations well.

105. The range of variation of this star is very small and on many of the plates the real light changes are probably masked by the accidental errors of measurement. The exact period has not been determined, but from an inspection of the observations of J.D. 5160, and J.D. 5161, it appears probable that the period is about $0^d.45$.

106. The elements given in the table satisfy the observations fairly well, but there are indications of a systematic deviation between the actual epochs of maximum and those computed by the elements given in the table. The residuals from the smooth curve are not very large, and may possibly be due to accidental errors or to an error in the period. If we assume a secular change in the period, the following formula will be found to satisfy well all the observations; J.D. $5021.311+0^d.54718\,E+0^d.03 \sin(0°.214\,E+313°.4)$.

107. The elements given do not well satisfy the observations, but are probably about right. The range of variation is rather small.

108. The elements given in the table involve only two especially large residuals from the smooth curve. As in other cases, however, there are indications of systematic differences which it seems difficult to explain on the supposition of a perfectly uniform period. All the observations are well satisfied by the use of the following formula; J.D. $5021.083+0^d.519607\,E+0^d.03 \sin(0°.110\,E+295°.6)$. A period of $0^d.52037$, involving five less returns of maximum between the extreme dates is about as good as the period given in the table. With its use there is the same appearance of systematic differences in the return of maximum.

109. The star is rather near the centre and has a close companion. The period given is probably about right although a few of the observations are rather discordant.

110. This star is rather near the centre and is somewhat difficult. The elements given in the table satisfy the observations fairly well with a few exceptions. The period $0^d.53531$ is about as satisfactory as the one given in the table, although it involves five more returns of maximum between the extreme dates. In either case there are indications of systematic differences, as in other cases.

111. This star is rather near the centre, has close companions, and is somewhat difficult. The elements given in the table satisfy the observations with a few exceptions. The large residuals may be due to accidental errors rather than to systematic deviations of any sort.

112. This star appears to vary slightly, but the range of variation is so small that no effort has been made to determine the period. The star is one of the most distant from the centre of the cluster.

113. This star is distant from the sequence of comparison stars, and measurements are therefore difficult. The range of variation is large. The rate of increase and decrease of brightness is very rapid, as is shown by the observations of J.D. 5160 and J.D. 5161. The period given in the table satisfies the observations fairly well, but there are several large residuals which may be due to accidental errors.

114. This star is distant from the centre of the cluster. The elements given in the table satisfy the observations well.

115. This star is very distant from the centre of the cluster. The elements given in the table satisfy all the observations fairly well, except that at J.D. 4841.603.

116. This star is distant from the centre of the cluster. The elements given in the table satisfy the observations well.

117. The elements given in the table satisfy the observations fairly well. The period $0^d.60153$, involving five less returns of maximum between the extreme dates, satisfies the observations about as well as the period given in the table. The range of variation is less than the average.

118. The elements given in the table satisfy the observations well.

119. The period given in the table satisfies well all the observations except those at J.D. 3390.524 and J.D. 4078.579. These discordances do not appear to be due to accidental errors. They may be due to systematic differences such as have been found for No. 94, and others. A period of $0^d.51702$, and also one of $0^d.51851$, the first involving five more, and the second, five less, returns of maximum between the extreme dates, serve fairly well but give less accordant results than $0^d.51776$.

120. The range of variation of this star is so small that the determination of the period from the available data is difficult if not impossible. The period $0^d.38752$ satisfies most of the observations very well, but this is shorter than any period in the cluster whose determination is at all sure. Also a period of $0^d.63013$ satisfies the observations nearly as well as the former period. It will be noted that both of these periods are sub-multiples of $1^d.26$.

121. This star is near the centre of the cluster and a difficult object. The accidental errors of measurement are undoubtedly large. The period given in the table is

probably about right, although there are many large residuals from the smooth curve. The period appears to be certainly a sub-multiple of about $2^d.0$, and the period given in the table, which is about one fourth that amount, seems better than one third, although the period $0^d.65695$ satisfies fairly well the greater part of the observations.

122. This star is near the centre and difficult. The variability is doubtful, and the range of variation, if genuine, is very small. No attempt has been made to find a period.

123. This star is the most distant from the centre of the cluster of any variable found. If it is a member of the system, as seems probable from the nature of its light changes, it extends the borders of the cluster considerably farther than they appear to reach from a count of the distribution, or from a visual examination. This star is 17′ from the centre, which would make the diameter of the cluster 34′, and indicates that such systems have outlying and scattered members at enormous distances from the centre. The elements given in the table satisfy all the observations well, but these observations include only those between J.D. 3372, and J.D. 4841, since the star is too remote from the centre to appear on the plates made by Keeler with the Crossley Reflector on J.D. 5160, and J.D. 5161.

124. This star seems surely variable, but the range is very small and no attempt has been made to determine the period.

125. The range of variation of this star is small. The elements given in the table satisfy the observations fairly well, and are probably about right.

126. This star is undoubtedly variable, but the range of variation is very small, and the results must be accepted with some doubt. The elements given in the table satisfy the observations fairly well, and may be about right.

127. This star appears to be variable, but the measures do not render this certain. It is a difficult object, having two close companions, one brighter and the other fainter than the variable, and both too near to be well separated on any of the plates. The brighter companion is at position 0°, distance 3″, magnitude 14.5. The fainter companion is at position 130°, distance 3″, magnitude 16.0.

128. This star has a relatively bright close companion, position 230°, distance 4″, magnitude 14.0. The accidental errors of measurement are large, but the elements given in the table are probably about right.

129. This star has a relatively bright close companion with which its image is confused on many plates. The companion is at position 270°, distance 4″, magnitude, 14.0. No attempt has been made to find a period, as the measures are difficult and the range of variation small.

130. This is a difficult star. The variability appears to be sure, but the range of variation is small and the accidental errors of measurement, large, so that the determination of a period from the available data would be difficult.

131. This star is near the centre of the cluster and has a faint companion, whose light, on nearly all the plates, is confused with that of the variable. The companion is at position 300°, distance 3″, magnitude 17.0. The light of both stars was measured. The period given in the table satisfies the observations fairly well under the circumstances, but it must be regarded as somewhat doubtful.

132. This star is near the centre and difficult. The elements given in the table involve large discordances but these may be due to the accidental errors of measurement. The period is probably about right.

133. This star is a close double and the light of both components was measured. The elements given in the table satisfy the observations well. It was not measured on the plates of J.D. 3372 and J.D. 3377, and on none of the Bruce plates, since the definition is inferior to that on the other plates.

134. This star has a close companion and is rather difficult of measurement. The elements given in the table, however, satisfy the observations well. The companion is at position 45°, distance 3″, magnitude 16.5.

135. This star appeared to vary when first examined. The measurements by Miss Leland, however, show that the variation, if genuine, is very small. The star is near the centre of the cluster and difficult.

136. This star appeared to vary when first examined. The measurements, however, show that the variation, if genuine, is very small. The star is near the centre and difficult.

137. This is a rather close and difficult star, but the elements given in the table satisfy the observations fairly well.

CHAPTER IV

MISCELLANEOUS RESULTS

THE coordinates of the light curves of all the variables in Messier 3, 110 in number, for which periods have been determined, are given in Table XVI. The period of each star was divided into twenty-four equal parts and the magnitudes corresponding to the points of division between the consecutive parts were read from the smooth curves drawn through all the observations. These results, especially those near maximum, must be regarded as approximate only, since the curves from which they were read were of small scale, and were drawn through all the observations. For a study of the effect of the duration of exposure, see page 88. The precise rate of increase is best derived from those stars in which this phase is covered by the series of Keeler plates on J. D. 2415160, or 2415161. The values thus obtained have been given in Table XV, expressed to hundredths of a magnitude. This is especially true, since a slight error or irregularity in the period will cause the apparent form of the curve just preceding maximum to vary much when the observations cover several years, but will not sensibly affect it when they all occur on the same night. The first column on each page of Table XVI contains the points of division into equal parts. The results for each star occupy three columns, the first of which gives the phase, the second, the corresponding magnitude, and the third, the differences found by subtracting the magnitude corresponding to each phase from the one immediately following it. The third column, therefore, gives the amount of increase or decrease, expressed in hundredths of a magnitude, for every twenty-fourth part of the period.

TABLE XVI

LIGHT CURVES

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 1			No. 3			No. 5			No. 6			No. 7		
	d.			d.			d.			d.			d.		
0	0.000	14.50	+ .03	0.000	14.50	+ .11	0.000	14.34	+ .09	0.000	14.40	+ .30	0.000	14.40	+ .08
1	0.022	14.53	+ .17	0.023	14.61	+ .13	0.021	14.43	+ .17	0.021	14.70	+ .40	0.021	14.48	+ .20
2	0.043	14.70	+ .20	0.047	14.74	+ .17	0.042	14.60	+ .20	0.043	15.10	+ .33	0.041	14.68	+ .22
3	0.065	14.90	+ .25	0.070	14.91	+ .17	0.063	14.80	+ .30	0.064	15.43	+ 15	0.062	14.90	+ .32
4	0.087	15.15	+ .29	0.093	15.08	+ .17	0.084	15.10	+ .27	0.086	15.58	+ .22	0.083	15.22	+ .30
5	0.108	15.44	+ .29	0.116	15.25	+ .21	0.105	15.37	+ .28	0.107	15.80	+ .14	0.104	15.52	+ .24
6	0.130	15.73	+ .29	0.140	15.46	+ .21	0.127	15.65	+ .20	0.129	15.94	+ .11	0.124	15.76	+ .24
7	0.152	16.02	+ .30	0.163	15.67	+ .22	0.148	15.85	+ .25	0.150	16.05	+ .15	0.145	16.00	+ .13
8	0.174	16.32	+ .16	0.186	15.89	+ .22	0.169	16.10	+ .20	0.171	16.20	+ .12	0.166	16.13	+ .11
9	0.195	16.48	+ .10	0.210	16.11	+ .16	0.190	16.30	+ .15	0.193	16.32	+ .14	0.187	16.24	+ .08
10	0.217	16.58	+ .05	0.233	16.27	+ .13	0.211	16.45	+ .12	0.214	16.46	+ .08	0.207	16.32	+ .04
11	0.239	16.63	+ .03	0.256	16.40	+ .15	0.232	16.57	+ .07	0.236	16.54	+ .10	0.228	16.36	+ .04
12	0.260	16.66	+ .01	0.280	16.55	+ .08	0.253	16.64	+ .06	0.257	16.64	+ .10	0.249	16.40	+ .03
13	0.282	16.67	.00	0.303	16.63	+ .05	0.274	16.70	+ .02	0.279	16.74	+ .05	0.269	16.43	+ .02
14	0.304	16.67	.00	0.326	16.68	+ .01	0.295	16.72	+ .01	0.300	16.79	+ .02	0.290	16.45	+ .02
15	0.326	16.67	− .01	0.350	16.69	+ .01	0.317	16.73	+ .02	0.321	16.81	+ .02	0.311	16.47	.00
16	0.347	16.66	.00	0.373	16.70	.00	0.338	16.75	.00	0.343	16.83	+ .02	0.332	16.47	+ .01
17	0.369	16.66	.00	0.396	16.70	.00	0.359	16.75	+ .01	0.364	16.85	+ .01	0.352	16.48	.00
18	0.391	16.66	− .01	0.419	16.70	.00	0.380	16.76	− .01	0.386	16.86	− .01	0.373	16.48	+ .01
19	0.412	16.65	.00	0.443	16.70	− .01	0.401	16.75	− .01	0.407	16.85	− .01	0.394	16.49	− .05
20	0.434	16.65	− .02	0.466	16.69	− .34	0.422	16.74	− .04	0.429	16.84	− .04	0.415	16.44	− .04
21	0.456	16.63	−1.28	0.489	16.35	− .95	0.443	16.70	− .21	0.450	16.80	−1.60	0.435	16.40	− .95
22	0.477	15.35	− .82	0.513	15.40	− .68	0.464	16.49	−1.49	0.471	15.20	− .80	0.456	15.45	− .95
23	0.499	14.53	− .03	0.536	14.72	− .22	0.485	15.00	− .66	0.493	14.40	.00	0.477	14.50	− .10
	No. 9			No. 10			No. 11			No. 13			No. 14		
	d.			d.			d.			d.			d.		
0	0.000	14.60	.00	0.000	14.76	+ .03	0.000	14.30	+ .15	0.000	14.50	+ .05	0.000	14.50	+ .10
1	0.023	14.60	+ .12	0.024	14.79	+ .07	0.021	14.45	+ .15	0.020	14.55	+ .08	0.026	14.60	+ .15
2	0.045	14.72	+ .31	0.047	14.86	+ .18	0.042	14.60	+ .22	0.040	14.63	+ .12	0.053	14.75	+ .21
3	0.068	15.03	+ .37	0.071	15.04	+ .26	0.064	14.82	+ .28	0.060	14.75	+ .18	0.079	14.96	+ .20
4	0.090	15.40	+ .38	0.095	15.30	+ .25	0.085	15.10	+ .25	0.081	14.93	+ .17	0.106	15.16	+ .34
5	0.113	15.78	+ .24	0.119	15.55	+ .35	0.106	15.35	+ .27	0.101	15.10	+ .20	0.132	15.50	+ .28
6	0.135	16.02	+ .18	0.142	15.90	+ .28	0.127	15.62	+ .21	0.121	15.30	+ .20	0.159	15.78	+ .27
7	0.158	16.20	+ .19	0.166	16.18	+ .28	0.148	15.83	+ .27	0.141	15.50	+ .12	0.185	16.05	+ .25
8	0.180	16.39	+ .15	0.190	16.46	+ .11	0.169	16.10	+ .20	0.161	15.62	+ .23	0.212	16.30	+ .12
9	0.203	16.54	+ .09	0.214	16.57	+ .05	0.190	16.30	+ .13	0.181	15.85	+ .15	0.238	16.42	+ .08

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 9			No. 10			No. 11			No. 13			No. 14		
	d.			d.			d.			d.			d.		
10	0.226	16.63	+ .05	0.237	16.62	+ .04	0.212	16.43	+ .08	0.201	16.00	+ .15	0.264	16.50	+ .03
11	0.248	16.68	+ .05	0.261	16.66	+ .02	0.233	16.51	+ .03	0.221	16.15	+ .18	0.291	16.53	.00
12	0.271	16.73	+ .01	0.285	16.68	+ .02	0.254	16.54	+ .01	0.242	16.33	+ .15	0.317	16.53	+ .01
13	0.293	16.74	+ .02	0.308	16.70	.00	0.275	16.55	+ .01	0.262	16.48	+ .07	0.344	16.54	.00
14	0.316	16.76	.00	0.332	16.70	.00	0.296	16.56	+ .02	0.282	16.55	+ .05	0.370	16.54	+ .01
15	0.338	16.76	.00	0.356	16.70	.00	0.317	16.58	+ .01	0.302	16.60	.00	0.397	16.55	− .01
16	0.361	16.76	.00	0.380	16.70	.00	0.339	16.59	+ .01	0.322	16.60	.00	0.423	16.54	− .04
17	0.383	16.76	.00	0.403	16.70	.00	0.360	16.60	.00	0.342	16.60	.00	0.450	16.50	− .30
18	0.406	16.76	.00	0.427	16.70	.00	0.381	16.60	.00	0.362	16.60	.00	0.476	16.20	− .51
19	0.429	16.76	.00	0.451	16.70	.00	0.402	16.60	− .01	0.383	16.60	.00	0.502	15.69	− .51
20	0.451	16.76	.00	0.475	16.70	.00	0.423	16.59	− .03	0.403	16.60	− .20	0.529	15.18	− .40
21	0.474	16.76	− .38	0.498	16.70	− .10	0.444	16.56	− .44	0.423	16.40	− .30	0.555	14.78	− .20
22	0.496	16.38	−1.38	0.522	15.60	− .65	0.465	16.12	−1.42	0.443	16.10	−1.38	0.582	14.58	− .06
23	0.519	15.00	−0.40	0.546	14.95	− .19	0.487	14.70	− .40	0.463	14.72	− .22	0.608	14.52	− .02
	No. 15			No. 16			No. 17			No. 18			No. 19		
	d.			d.			d.			d.			d.		
0	0.000	14.50	+ .12	0.000	14.70	+ .15	0.000	15.00	+ .04	0.000	15.00	+ .05	0.000	15.60	.00
1	0.022	14.62	+ .20	0.021	14.85	+ .18	0.024	15.04	+ .19	0.022	15.05	+ .13	0.017	15.60	+ .03
2	0.044	14.82	+ .23	0.043	15.03	+ .17	0.048	15.23	+ .29	0.043	15.18	+ .22	0.034	15.63	+ .07
3	0.066	15.05	+ .25	0.064	15.20	+ .15	0.072	15.52	+ .24	0.065	15.40	+ .22	0.051	15.70	+ .05
4	0.088	15.30	+ .30	0.085	15.35	+ .19	0.096	15.76	+ .24	0.086	15.62	+ .22	0.069	15.75	+ .11
5	0.110	15.60	+ .25	0.107	15.54	+ .16	0.120	16.00	+ .30	0.108	15.84	+ .11	0.086	15.86	+ .15
6	0.133	15.85	+ .20	0.128	15.70	+ .20	0.144	16.30	+ .15	0.129	15.95	+ .20	0.103	16.01	+ .24
7	0.155	16.05	+ .15	0.149	15.90	+ .17	0.168	16.45	+ .10	0.151	16.15	+ .11	0.120	16.25	+ .15
8	0.177	16.20	+ .15	0.170	16.07	+ .19	0.192	16.55	+ .09	0.172	16.26	+ .12	0.137	16.40	+ .15
9	0.199	16.35	+ .13	0.192	16.26	+ .18	0.216	16.64	+ .06	0.194	16.38	+ .12	0.154	16.55	+ .08
10	0.221	16.48	+ .07	0.213	16.44	+ .12	0.240	16.70	+ .04	0.215	16.50	+ .08	0.172	16.63	+ .05
11	0.243	16.55	+ .05	0.234	16.56	+ .14	0.264	16.74	+ .02	0.237	16.58	+ .01	0.189	16.68	+ .05
12	0.265	16.60	.00	0.256	16.70	+ .08	0.288	16.76	+ .01	0.258	16.59	+ .11	0.206	16.73	+ .02
13	0.287	16.60	.00	0.277	16.78	+ .06	0.312	16.77	+ .01	0.280	16.70	+ .03	0.223	16.75	+ .02
14	0.309	16.60	+ .01	0.298	16.84	.00	0.336	16.78	+ .01	0.301	16.73	+ .01	0.240	16.77	+ .01
15	0.331	16.61	+ .01	0.320	16.84	.00	0.360	16.79	− .02	0.323	16.74	+ .02	0.257	16.78	+ .02
16	0.353	16.62	.00	0.341	16.84	.00	0.384	16.77	.00	0.344	16.76	+ .01	0.274	16.80	+ .02
17	0.376	16.62	.00	0.362	16.84	− .01	0.408	16.77	.00	0.366	16.77	.00	0.292	16.82	.00
18	0.398	16.62	.00	0.384	16.83	− .18	0.432	16.77	.00	0.387	16.77	.00	0.309	16.82	.00
19	0.420	16.62	− .03	0.405	16.65	− .47	0.456	16.77	− .01	0.409	16.77	− .02	0.326	16.82	− .04
20	0.442	16.59	− .03	0.426	16.18	− .65	0.480	16.76	− .01	0.430	16.75	− .05	0.343	16.78	− .28
21	0.464	16.56	− .11	0.448	15.53	− .53	0.504	16.75	− .30	0.452	16.70	− .05	0.360	16.50	− .73
22	0.486	16.45	− .62	0.469	15.00	− .31	0.528	16.45	−1.21	0.473	15.65	− .65	0.377	15.77	− .17
23	0.508	15.07	− .57	0.490	14.69	+ .01	0.552	15.24	− .24	0.495	15.00	.00	0.395	15.60	.00

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 20			No. 21			No. 22			No. 23			No. 24		
	d.			d.			d.			d.			d.		
0	0.000	14.44	+ .11	0.000	14.90	+ .02	0.000	14.34	+ .04	0.000	14.50	+ .05	0.000	14.80	+ .04
1	0.020	14.55	+ .25	0.022	14.92	+ .11	0.020	14.38	+ .22	0.025	14.55	+ .10	0.028	14.84	+ .08
2	0.041	14.80	+ .20	0.043	15.03	+ .20	0.040	14.60	+ .46	0.050	14.65	+ .10	0.055	14.92	+ .11
3	0.061	15.00	+ .20	0.065	15.23	+ .21	0.060	15.06	+ .29	0.075	14.75	+ .11	0.083	15.03	+ .18
4	0.082	15.20	+ .20	0.086	15.44	+ .26	0.080	15.35	+ .30	0.100	14.86	+ .09	0.111	15.21	+ .14
5	0.102	15.40	+ .22	0.108	15.70	+ .22	0.100	15.65	+ .30	0.125	14.95	+ .17	0.138	15.35	+ .25
6	0.123	15.62	+ .15	0.129	15.92	+ .24	0.120	15.95	+ .17	0.149	15.12	+ .12	0.166	15.60	+ .24
7	0.143	15.77	+ .23	0.151	16.16	+ .16	0.140	16.12	+ .18	0.174	15.24	+ .12	0.194	15.84	+ .21
8	0.164	16.00	+ .14	0.172	16.32	+ .12	0.160	16.30	+ .10	0.199	15.36	+ .15	0.222	16.05	+ .13
9	0.184	16.14	+ .16	0.194	16.44	+ .16	0.181	16.40	+ .10	0.224	15.51	+ .11	0.249	16.18	+ .14
10	0.205	16.30	+ .13	0.215	16.60	+ .10	0.201	16.50	+ .10	0.249	15.62	+ .11	0.277	16.32	+ .06
11	0.225	16.43	+ .09	0.237	16.70	+ .07	0.221	16.60	+ .09	0.274	15.73	+ .10	0.305	16.38	+ .06
12	0.246	16.52	+ .08	0.258	16.77	+ .05	0.241	16.69	+ .06	0.299	15.83	+ .09	0.332	16.44	+ .03
13	0.266	16.60	+ .07	0.280	16.82	+ .02	0.261	16.75	+ .05	0.324	15.92	+ .04	0.360	16.47	+ .03
14	0.287	16.67	+ .06	0.301	16.84	+ .02	0.281	16.80	+ .04	0.349	15.96	+ .04	0.388	16.50	+ .02
15	0.307	16.73	+ .02	0.323	16.86	+ .02	0.301	16.84	+ .03	0.374	16.00	+ .02	0.415	16.52	+ .03
16	0.328	16.75	+ .02	0.344	16.88	+ .01	0.321	16.87	+ .01	0.398	16.02	.00	0.443	16.55	+ .01
17	0.348	16.77	.00	0.366	16.89	+ .01	0.341	16.88	+ .02	0.423	16.02	− .01	0.471	16.56	+ .01
18	0.368	16.77	+ .01	0.387	16.90	.00	0.361	16.90	− .02	0.448	16.01	− .01	0.498	16.57	+ .03
19	0.389	16.78	− .28	0.409	16.90	.00	0.381	16.88	− .08	0.473	16.00	− .05	0.526	16.60	− .02
20	0.409	16.50	− .20	0.430	16.90	− .17	0.401	16.80	− .25	0.498	15.95	− .10	0.554	16.58	− .04
21	0.430	16.30	−1.62	0.452	16.73	−1.03	0.421	16.55	−1.05	0.523	15.85	−1.15	0.582	16.54	−1.54
22	0.450	14.68	− .21	0.473	15.70	− .56	0.441	15.50	−1.00	0.548	14.70	− .16	0.609	15.00	− .18
23	0.471	14.47	− .03	0.495	15.14	− .24	0.461	14.50	− .16	0.573	14.54	− .04	0.637	14.82	− .02
	No. 25			No. 26			No. 27			No. 28			No. 31		
	d.			d.			d.			d.			d.		
0	0.000	14.64	+ .02	0.000	14.50	+ .06	0.000	15.00	+ .14	0.000	14.50	+ .04	0.000	14.50	+ .02
1	0.020	14.66	+ .09	0.025	14.56	+ .18	0.024	15.14	+ .29	0.020	14.54	+ .14	0.024	14.52	+ .12
2	0.040	14.75	+ .15	0.050	14.74	+ .32	0.048	15.43	+ .37	0.040	14.68	+ .32	0.048	14.64	+ .12
3	0.060	14.90	+ .36	0.075	15.06	+ .29	0.073	15.80	+ .27	0.059	15.00	+ .40	0.073	14.76	+ .31
4	0.080	15.26	+ .39	0.100	15.35	+ .25	0.097	16.07	+ .16	0.079	15.40	+ .30	0.097	15.07	+ .46
5	0.100	15.65	+ .45	0.125	15.60	+ .24	0.121	16.23	+ .19	0.099	15.70	+ .20	0.121	15.53	+ .27
6	0.120	16.10	+ .24	0.149	15.84	+ .26	0.145	16.42	+ .08	0.119	15.90	+ .17	0.145	15.80	+ .20
7	0.140	16.34	+ .12	0.174	16.10	+ .13	0.169	16.50	+ .04	0.139	16.07	+ .08	0.169	16.00	+ .13
8	0.160	16.46	+ .09	0.199	16.23	+ .13	0.194	16.54	+ .05	0.158	16.15	+ .08	0.194	16.13	+ .09
9	0.180	16.55	+ .08	0.224	16.36	+ .11	0.218	16.59	+ .04	0.178	16.23	+ .04	0.218	16.22	+ .10
10	0.200	16.63	+ .03	0.249	16.47	+ .09	0.242	16.63	.00	0.198	16.27	+ .03	0.242	16.32	+ .04
11	0.220	16.66	+ .04	0.274	16.56	+ .04	0.266	16.63	+ .03	0.218	16.30	.00	0.266	16.36	+ .04

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 25			No. 26			No. 27			No. 28			No. 31		
	d.			d.			d.			d.			d.		
12	0.240	16.70	+ .02	0.299	16.60	.00	0.290	16.66	.00	0.238	16.30	.00	0.290	16.40	+ .07
13	0.260	16.72	+ .02	0.324	16.60	.00	0.315	16.66	+ .01	0.258	16.30	.00	0.315	16.47	+ .03
14	0.280	16.74	.00	0.349	16.60	.00	0.339	16.67	.00	0.277	16.30	.00	0.339	16.50	+ .02
15	0.300	16.74	.00	0.374	16.60	.00	0.363	16.67	.00	0.297	16.30	.00	0.363	16.52	+ .02
16	0.320	16.74	− .01	0.398	16.60	− .02	0.387	16.67	.00	0.317	16.30	.00	0.387	16.54	+ .02
17	0.340	16.73	− .01	0.423	16.58	− .03	0.411	16.67	− .03	0.337	16.30	.00	0.411	16.56	.00
18	0.360	16.72	− .04	0.448	16.55	− .05	0.436	16.64	− .14	0.357	16.30	.00	0.436	16.56	− .01
19	0.380	16.68	− .13	0.473	16.60	− .28	0.460	16.50	− .40	0.376	16.30	.00	0.460	16.55	− .03
20	0.400	16.55	− .35	0.498	16.32	− .32	0.484	16.10	− .54	0.396	16.30	− .10	0.484	16.52	− .32
21	0.420	16.20	− .70	0.523	16.00	− .46	0.508	15.64	− .38	0.416	16.20	− .17	0.508	16.20	− 1.23
22	0.440	15.50	− .40	0.548	15.54	− .51	0.532	15.26	− .19	0.436	16.03	− 1.37	0.532	14.97	− .30
23	0.460	14.90	− .26	0.573	15.03	− .53	0.556	15.07	− .07	0.456	14.66	− .16	0.557	14.67	− .17
	No. 32			No. 33			No. 34			No. 35			No. 36		
	d.			d.			d.			d.			d.		
0	0.000	14.35	+ .18	0.000	14.70	+ .14	0.000	15.00	+ .02	0.000	14.65	+ .03	0.000	14.80	+ .09
1	0.021	14.53	+ .02	0.022	14.84	+ .23	0.023	15.02	+ .08	0.022	14.68	+ .12	0.023	14.89	+ .21
2	0.041	14.55	+ .25	0.044	15.07	+ .33	0.047	15.10	+ .30	0.044	14.80	+ .25	0.045	15.10	+ .34
3	0.062	14.80	+ .35	0.066	15.40	+ .28	0.070	15.40	+ .10	0.066	15.05	+ .24	0.068	15.44	+ .16
4	0.083	15.15	+ .35	0.088	15.68	+ .22	0.093	15.50	+ .30	0.088	15.29	+ .31	0.091	15.60	+ .30
5	0.103	15.50	+ .30	0.109	15.90	+ .23	0.116	15.80	+ .30	0.111	15.60	+ .30	0.114	15.90	+ .32
6	0.124	15.80	+ .30	0.131	16.13	+ .11	0.140	16.10	+ .20	0.133	15.90	+ .30	0.136	16.22	+ .18
7	0.144	16.10	+ .16	0.153	16.24	+ .11	0.163	16.30	+ .18	0.155	16.20	+ .15	0.159	16.40	+ .12
8	0.165	16.26	+ .12	0.175	16.35	+ .09	0.186	16.48	+ .06	0.177	16.35	+ .14	0.182	16.52	+ .08
9	0.186	16.38	+ .06	0.197	16.44	+ .08	0.210	16.54	+ .02	0.199	16.49	+ .08	0.205	16.60	+ .07
10	0.206	16.44	+ .06	0.219	16.52	+ .04	0.233	16.56	+ .07	0.221	16.57	+ .03	0.227	16.67	+ .05
11	0.227	16.50	+ .03	0.241	16.56	+ .06	0.256	16.63	+ .02	0.243	16.60	+ .02	0.250	16.72	+ .03
12	0.248	16.53	+ .04	0.263	16.62	+ .03	0.280	16.65	+ .02	0.265	16.62	+ .02	0.273	16.75	+ .03
13	0.268	16.57	+ .01	0.285	16.65	+ .05	0.303	16.67	+ .01	0.287	16.64	+ .01	0.296	16.78	+ .02
14	0.289	16.58	+ .01	0.306	16.70	.00	0.326	16.68	+ .02	0.310	16.65	+ .01	0.318	16.80	.00
15	0.310	16.59	+ .01	0.328	16.70	+ .04	0.349	16.70	.00	0.332	16.66	+ .01	0.341	16.80	.00
16	0.330	16.60	.00	0.350	16.74	.00	0.373	16.70	.00	0.354	16.67	.00	0.364	16.80	.00
17	0.351	16.60	.00	0.372	16.74	+ .01	0.396	16.70	.00	0.376	16.67	+ .01	0.386	16.80	.00
18	0.372	16.60	.00	0.394	16.75	+ .01	0.419	16.70	.00	0.398	16.68	.00	0.409	16.80	.00
19	0.392	16.60	− .01	0.416	16.76	.00	0.443	16.70	.00	0.420	16.68	− .01	0.432	16.80	.00
20	0.413	16.59	− .11	0.438	16.76	− .21	0.466	16.70	− .16	0.442	16.67	− .03	0.455	16.80	− .20
21	0.433	16.48	− .88	0.460	16.55	− .85	0.489	16.54	− 1.00	0.464	16.64	− .14	0.477	16.60	− 1.50
22	0.454	15.60	− 1.15	0.481	15.70	− .90	0.512	15.54	− .37	0.486	16.50	− .10	0.500	15.10	− .24
23	0.475	14.45	− .10	0.503	14.80	− .10	0.536	15.17	− .17	0.509	15.60	− .95	0.523	14.86	− .06

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 38			No. 39			No. 40			No. 41			No. 42		
	d.			d.			d.			d.			d.		
0	0.000	14.80	+ .01	0.000	14.60	+ .13	0.000	14.70	+ .03	0.000	15.00	+ .00	0.000	14.20	+ .09
1	0.023	14.81	+ .13	0.024	14.73	+ .24	0.023	14.73	+ .06	0.020	15.00	+ .02	0.025	14.29	+ .19
2	0.047	14.94	+ .19	0.049	14.97	+ .25	0.046	14.79	+ .18	0.040	15.02	+ .07	0.049	14.48	+ .25
3	0.070	15.13	+ .23	0.073	15.22	+ .26	0.069	14.97	+ .24	0.061	15.09	+ .13	0.074	14.73	+ .25
4	0.094	15.36	+ .24	0.098	15.48	+ .26	0.092	15.21	+ .27	0.081	15.22	+ .70	0.098	14.98	+ .24
5	0.117	15.60	+ .30	0.122	15.74	+ .24	0.115	15.48	+ .33	0.101	15.92	+ .28	0.123	15.22	+ .22
6	0.140	15.90	+ .29	0.147	15.98	+ .20	0.138	15.81	+ .34	0.121	16.20	+ .14	0.148	15.44	+ .19
7	0.164	16.19	+ .23	0.171	16.18	+ .14	0.161	16.15	+ .23	0.142	16.34	+ .06	0.172	15.63	+ .14
8	0.187	16.42	+ .16	0.196	16.32	+ .11	0.184	16.38	+ .15	0.162	16.40	+ .06	0.197	15.77	+ .14
9	0.210	16.58	+ .09	0.220	16.43	+ .07	0.207	16.53	+ .11	0.182	16.46	+ .05	0.221	15.91	+ .11
10	0.234	16.67	+ .06	0.245	16.50	+ .08	0.230	16.64	+ .08	0.202	16.51	+ .06	0.246	16.02	+ .12
11	0.257	16.73	+ .04	0.269	16.58	+ .06	0.253	16.72	+ .02	0.223	16.57	+ .03	0.271	16.14	+ .10
12	0.280	16.77	+ .02	0.294	16.64	+ .04	0.276	16.74	+ .03	0.243	16.60	+ .04	0.295	16.24	+ .10
13	0.304	16.79	+ .01	0.318	16.68	+ .02	0.299	16.77	+ .02	0.263	16.64	+ .05	0.320	16.34	+ .08
14	0.327	16.80	+ .02	0.342	16.70	+ .01	0.322	16.79	+ .03	0.283	16.69	+ .03	0.344	16.42	+ .08
15	0.351	16.82	+ .01	0.367	16.71	+ .02	0.345	16.82	+ .01	0.304	16.72	+ .01	0.369	16.50	+ .07
16	0.374	16.83	.00	0.391	16.73	.00	0.368	16.83	.00	0.324	16.73	+ .02	0.393	16.57	+ .03
17	0.397	16.83	.00	0.416	16.73	.00	0.391	16.83	.00	0.344	16.75	− .01	0.418	16.60	+ .01
18	0.421	16.83	.00	0.440	16.73	.00	0.414	16.83	.00	0.364	16.74	− .02	0.443	16.61	+ .02
19	0.444	16.83	− .01	0.465	16.73	− .02	0.437	16.83	.00	0.384	16.72	− .17	0.467	16.63	+ .01
20	0.467	16.82	− .03	0.489	16.71	− .13	0.460	16.83	− .06	0.405	16.55	− .64	0.492	16.64	− .01
21	0.491	16.79	−1.49	0.514	16.58	− .98	0.483	16.77	− .39	0.425	15.91	− .51	0.516	16.63	−1.16
22	0.514	15.30	− .47	0.538	15.60	− .66	0.506	16.38	−1.30	0.445	15.40	− .28	0.541	15.47	−1.01
23	0.538	14.83	− .03	0.563	14.94	− .34	0.529	15.08	− .38	0.465	15.12	− .12	0.566	14.46	− .26
	No. 43			No. 44			No. 45			No. 46			No. 47		
	d.			d.			d.			d.			d.		
0	0.000	14.60	+ .03	0.000	15.10	− .33	0.000	14.80	+ .21	0.000	15.40	+ .08	0.000	14.81	+ .22
1	0.023	14.63	+ .07	0.021	14.77	− .07	0.022	15.01	+ .35	0.026	15.48	+ .16	0.023	15.03	+ .22
2	0.045	14.70	+ .12	0.042	14.70	+ .22	0.045	15.36	+ .24	0.051	15.64	+ .16	0.045	15.25	+ .25
3	0.068	14.82	+ .26	0.063	14.92	+ .29	0.067	15.60	+ .32	0.077	15.80	+ .19	0.068	15.50	+ .23
4	0.090	15.08	+ .28	0.084	15.21	+ .29	0.089	15.92	+ .23	0.102	15.99	+ .18	0.090	15.73	+ .25
5	0.113	15.36	+ .27	0.106	15.50	+ .27	0.112	16.15	+ .17	0.128	16.17	+ .15	0.113	15.98	+ .19
6	0.135	15.63	+ .19	0.127	15.77	+ .25	0.134	16.32	+ .15	0.153	16.32	+ .12	0.135	16.17	+ .15
7	0.158	15.82	+ .18	0.148	16.02	+ .26	0.157	16.47	+ .12	0.179	16.44	+ .06	0.158	16.32	+ .18
8	0.180	16.00	+ .12	0.169	16.28	+ .11	0.179	16.59	+ .10	0.204	16.50	+ .06	0.180	16.50	+ .12
9	0.203	16.12	+ .11	0.190	16.39	+ .09	0.201	16.69	+ .07	0.230	16.56	+ .05	0.203	16.62	+ .09
10	0.225	16.23	+ .09	0.211	16.48	+ .09	0.224	16.76	+ .04	0.255	16.61	+ .03	0.225	16.71	+ .08
11	0.248	16.32	+ .10	0.232	16.57	+ .05	0.246	16.80	+ .04	0.281	16.64	+ .02	0.248	16.79	+ .09

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 43			No. 44			No. 45			No. 46			No. 47		
	d.			d.			d.			d.			d.		
12	0.270	16.42	+ .07	0.253	16.62	+ .04	0.268	16.84	+ .02	0.306	16.66	+ .01	0.270	16.88	+ .04
13	0.293	16.49	+ .06	0.274	16.66	+ .01	0.291	16.86	+ .01	0.332	16.67	+ .02	0.293	16.92	+ .01
14	0.315	16.55	+ .06	0.295	16.67	.00	0.313	16.87	+ .01	0.357	16.69	+ .01	0.316	16.93	− .01
15	0.338	16.61	+ .02	0.316	16.67	+ .01	0.336	16.88	+ .01	0.383	16.70	.00	0.338	16.92	− .10
16	0.360	16.63	+ .01	0.338	16.68	.00	0.358	16.89	+ .01	0.408	16.70	.00	0.361	16.82	− .14
17	0.383	16.64	.00	0.359	16.68	.00	0.380	16.90	.00	0.434	16.70	− .01	0.383	16.68	− .28
18	0.405	16.64	.00	0.380	16.68	− .01	0.403	16.90	.00	0.459	16.69	− .01	0.406	16.40	− .30
19	0.428	16.64	− .13	0.401	16.67	− .04	0.425	16.90	− .01	0.485	16.68	− .03	0.428	16.10	− .38
20	0.450	16.51	− .59	0.422	16.63	− .31	0.447	16.89	− .04	0.510	16.65	− .08	0.451	15.72	− .42
21	0.473	15.92	− .78	0.443	16.32	− .64	0.470	16.85	− 1.02	0.536	16.57	− .44	0.473	15.30	− .35
22	0.495	15.14	− .34	0.464	15.68	− .34	0.492	15.83	− .84	0.561	16.13	− .48	0.496	14.95	− .17
23	0.518	14.80	− .20	0.485	15.34	− .24	0.515	14.99	− .19	0.587	15.65	− .25	0.518	14.78	+ .03
	No. 48			No. 49			No. 50			No. 51			No. 52		
	d.			d.			d.			d.			d.		
0	0.000	15.00	+ .08	0.000	14.80	+ .09	0.000	14.70	+ .03	0.000	15.03	− .03	0.000	14.51	+ .02
1	0.026	15.08	+ .18	0.023	14.89	+ .13	0.021	14.73	+ .09	0.024	15.00	+ .10	0.022	14.53	+ .14
2	0.052	15.26	+ .18	0.046	15.02	+ .16	0.043	14.82	+ .15	0.049	15.10	+ .18	0.043	14.67	+ .19
3	0.078	15.44	+ .22	0.069	15.18	+ .20	0.064	14.97	+ .15	0.073	15.28	+ .23	0.065	14.86	+ .32
4	0.105	15.66	+ .18	0.091	15.38	+ .20	0.086	15.12	+ .22	0.097	15.51	+ .28	0.086	15.18	+ .31
5	0.131	15.84	+ .14	0.114	15.58	+ .28	0.107	15.34	+ .34	0.122	15.79	+ .25	0.108	15.49	+ .26
6	0.157	15.98	+ .15	0.137	15.86	+ .37	0.128	15.68	+ .36	0.146	16.04	+ .19	0.129	15.75	+ .23
7	0.183	16.13	+ .11	0.160	16.23	+ .21	0.150	16.04	+ .29	0.170	16.23	+ .20	0.151	15.98	+ .19
8	0.209	16.24	+ .13	0.183	16.44	+ .09	0.171	16.33	+ .27	0.195	16.43	+ .13	0.172	16.17	+ .12
9	0.235	16.37	+ .07	0.206	16.53	+ .05	0.192	16.60	+ .09	0.219	16.56	+ .11	0.194	16.29	+ .08
10	0.262	16.44	+ .08	0.228	16.58	+ .05	0.214	16.69	+ .04	0.243	16.67	+ .04	0.215	16.37	+ .03
11	0.288	16.52	+ .05	0.251	16.63	+ .04	0.235	16.73	+ .02	0.268	16.71	.00	0.237	16.40	+ .02
12	0.314	16.57	+ .03	0.274	16.67	+ .01	0.257	16.75	+ .01	0.292	16.71	− .01	0.258	16.42	+ .01
13	0.340	16.60	+ .01	0.297	16.68	+ .01	0.278	16.76	.00	0.316	16.70	.00	0.280	16.43	+ .01
14	0.366	16.61	.00	0.320	16.69	+ .03	0.299	16.76	.00	0.341	16.70	.00	0.301	16.44	+ .01
15	0.392	16.61	− .01	0.343	16.72	+ .01	0.321	16.76	.00	0.365	16.70	.00	0.323	16.45	+ .01
16	0.419	16.60	− .02	0.365	16.73	+ .02	0.342	16.76	.00	0.389	16.70	.00	0.344	16.46	.00
17	0.445	16.58	− .06	0.388	16.75	+ .01	0.363	16.76	.00	0.414	16.70	− .01	0.366	16.46	+ .01
18	0.471	16.52	− .10	0.411	16.76	.00	0.385	16.76	.00	0.438	16.69	− .06	0.387	16.47	.00
19	0.497	16.42	− .21	0.434	16.76	− .03	0.406	16.76	.00	0.462	16.63	− .10	0.409	16.47	.00
20	0.523	16.21	− .38	0.457	16.73	− .68	0.428	16.76	− .01	0.487	16.53	− .20	0.430	16.47	− .01
21	0.549	15.83	− .34	0.480	16.05	− 1.06	0.449	16.75	− .25	0.511	16.33	− .29	0.452	16.46	− .42
22	0.576	15.49	− .29	0.502	14.99	− .22	0.470	16.50	− 1.73	0.535	16.04	− .58	0.473	16.04	− .72
23	0.602	15.20	− .20	0.525	14.77	+ .03	0.492	14.77	− .07	0.560	15.46	− .43	0.495	15.32	− .81

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 53			No. 54			No. 55			No. 56			No. 57		
	d.			d.			d.			d.			d.		
0	0.000	14.33	+ .15	0.000	14.40	+ .16	0.000	14.50	+ .10	0.000	14.90	+ .03	0.000	14.64	+ .07
1	0.021	14.48	+ .30	0.021	14.56	+ .23	0.022	14.60	+ .14	0.021	14.93	+ .11	0.021	14.71	+ .16
2	0.042	14.78	+ .31	0.042	14.79	+ .26	0.044	14.74	+ .16	0.041	15.04	+ .14	0.043	14.87	+ .20
3	0.063	15.09	+ .40	0.063	15.05	+ .26	0.066	14.90	+ .15	0.062	15.18	+ .15	0.064	15.07	+ .22
4	0.084	15.49	+ .33	0.084	15.31	+ .27	0.088	15.05	+ .17	0.083	15.33	+ .15	0.086	15.29	+ .24
5	0.105	15.82	+ .19	0.104	15.58	+ .23	0.111	15.22	+ .15	0.103	15.48	+ .12	0.107	15.53	+ .27
6	0.126	16.01	+ .14	0.125	15.81	+ .19	0.133	15.37	+ .13	0.124	15.60	+ .12	0.128	15.80	+ .28
7	0.147	16.15	+ .10	0.146	16.00	+ .15	0.155	15.50	+ .14	0.144	15.72	+ .10	0.150	16.08	+ .20
8	0.168	16.25	+ .09	0.167	16.15	+ .12	0.177	15.64	+ .13	0.165	15.82	+ .10	0.171	16.28	+ .14
9	0.189	16.34	+ .06	0.188	16.27	+ .08	0.199	15.77	+ .14	0.186	15.92	+ .09	0.192	16.42	+ .10
10	0.210	16.40	+ .06	0.209	16.35	+ .06	0.221	15.91	+ .16	0.206	16.01	+ .06	0.214	16.52	+ .07
11	0.231	16.46	+ .05	0.230	16.41	+ .03	0.243	16.07	+ .13	0.227	16.07	+ .07	0.235	16.59	+ .05
12	0.252	16.51	+ .03	0.251	16.44	+ .02	0.265	16.20	+ .13	0.248	16.14	+ .07	0.257	16.64	+ .04
13	0.274	16.54	+ .03	0.272	16.46	+ .01	0.287	16.33	+ .15	0.268	16.21	+ .06	0.278	16.68	+ .03
14	0.295	16.57	+ .01	0.293	16.47	+ .01	0.309	16.48	+ .12	0.289	16.27	+ .05	0.299	16.71	+ .01
15	0.316	16.58	+ .01	0.313	16.48	+ .01	0.332	16.60	+ .08	0.310	16.32	+ .04	0.321	16.72	.00
16	0.337	16.59	.00	0.334	16.49	+ .01	0.354	16.68	+ .05	0.330	16.36	+ .02	0.342	16.72	+ .01
17	0.358	16.59	+ .01	0.355	16.50	.00	0.376	16.73	+ .03	0.351	16.38	− .09	0.363	16.73	+ .01
18	0.379	16.60	− .01	0.376	16.50	.00	0.398	16.76	+ .01	0.372	16.29	− .21	0.385	16.74	.00
19	0.400	16.59	− .01	0.397	16.50	.00	0.420	16.77	.00	0.392	16.08	− .28	0.406	16.74	− .01
20	0.421	16.58	− .01	0.418	16.50	− .01	0.442	16.77	.00	0.413	15.80	− .30	0.428	16.73	− .01
21	0.442	16.57	− .02	0.439	16.49	−0.59	0.464	16.77	− .02	0.433	15.50	− .29	0.449	16.72	− .88
22	0.463	16.55	−1.37	0.460	15.90	−1.28	0.486	16.75	− .83	0.454	15.21	− .20	0.470	15.84	− .84
23	0.484	15.18	− .85	0.481	14.62	− .22	0.508	15.92	−1.42	0.475	15.01	− .11	0.492	15.00	− .36
	No. 58			No. 59			No. 60			No. 61			No. 62		
	d.			d.			d.			d.			d.		
0	0.000	14.60	+ .02	0.000	14.86	+ .10	0.000	15.00	+ .12	0.000	14.74	+ .04	0.000	15.24	+ .04
1	0.022	14.62	+ .10	0.025	14.96	+ .17	0.029	15.12	+ .17	0.022	14.78	+ .11	0.027	15.28	+ .12
2	0.043	14.72	+ .11	0.049	15.13	+ .24	0.059	15.29	+ .20	0.043	14.89	+ .24	0.054	15.40	+ .19
3	0.065	14.83	+ .14	0.074	15.37	+ .24	0.089	15.49	+ .19	0.065	15.13	+ .30	0.082	15.59	+ .26
4	0.086	14.97	+ .15	0.098	15.61	+ .22	0.118	15.68	+ .18	0.087	15.43	+ .37	0.109	15.85	+ .28
5	0.108	15.12	+ .19	0.123	15.83	+ .18	0.147	15.86	+ .16	0.109	15.80	+ .23	0.136	16.13	+ .19
6	0.129	15.31	+ .21	0.147	16.01	+ .18	0.177	16.02	+ .11	0.130	16.03	+ .19	0.163	16.32	+ .09
7	0.151	15.52	+ .20	0.172	16.19	+ .15	0.206	16.13	+ .08	0.152	16.22	+ .12	0.190	16.41	+ .06
8	0.172	15.72	+ .20	0.196	16.34	+ .15	0.236	16.21	+ .07	0.174	16.34	+ .14	0.217	16.47	+ .01
9	0.194	15.92	+ .19	0.221	16.49	+ .09	0.265	16.28	+ .06	0.195	16.48	+ .08	0.245	16.48	+ .03
10	0.215	16.11	+ .11	0.245	16.58	+ .06	0.295	16.34	+ .06	0.217	16.56	+ .06	0.272	16.51	+ .01
11	0.237	16.22	+ .09	0.270	16.64	+ .04	0.324	16.40	+ .07	0.239	16.62	+ .02	0.299	16.52	+ .02

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 58			No. 59			No. 60			No. 61			No. 62		
	d.			d.			d.			d.			d.		
12	0.258	16.31	+ .03	0.294	16.68	+ .04	0.354	16.47	+ .04	0.260	16.64	+ .01	0.326	16.54	+ .02
13	0.280	16.34	+ .02	0.319	16.72	+ .01	0.383	16.51	+ .04	0.282	16.65	.00	0.353	16.56	+ .01
14	0.301	16.36	+ .01	0.343	16.73	+ .01	0.413	16.55	+ .05	0.304	16.65	+ .01	0.381	16.57	.00
15	0.323	16.37	− .03	0.368	16.74	+ .02	0.442	16.60	+ .04	0.326	16.66	.00	0.408	16.57	+ .01
16	0.344	16.34	− .06	0.393	16.76	+ .01	0.472	16.64	+ .04	0.347	16.66	.00	0.435	16.58	+ .01
17	0.366	16.28	− .27	0.417	16.77	.00	0.501	16.68	+ .04	0.369	16.66	.00	0.462	16.59	− .01
18	0.387	16.01	− .47	0.442	16.77	.00	0.531	16.72	+ .02	0.391	16.66	.00	0.489	16.58	− .10
19	0.409	15.54	− .32	0.466	16.77	− .01	0.560	16.74	+ .02	0.412	16.66	− .02	0.516	16.48	− .66
20	0.430	15.22	− .24	0.491	16.76	− .02	0.590	16.76	− .14	0.434	16.64	− .11	0.544	15.82	− .35
21	0.452	14.98	− .19	0.515	16.74	− .27	0.619	16.62	− .76	0.456	16.53	−1.45	0.571	15.47	− .13
22	0.473	14.79	− .13	0.540	16.47	−1.15	0.649	15.86	− .59	0.478	15.08	− .26	0.598	15.34	− .07
23	0.495	14.66	− .06	0.564	15.32	− .46	0.678	15.27	− .27	0.499	14.82	− .08	0.625	15.27	− .03
	No. 63			No. 64			No. 65			No. 66			No. 67		
	d.			d.			d.			d.			d.		
0	0.000	14.70	+ .28	0.000	15.00	+ .04	0.000	14.49	+ .17	0.000	15.01	+ .13	0.000	14.52	+ .06
1	0.024	14.98	+ .28	0.025	15.04	+ .27	0.028	14.66	+ .22	0.026	15.14	+ .16	0.024	14.58	+ .15
2	0.048	15.26	+ .24	0.050	15.31	+ .30	0.056	14.88	+ .31	0.052	15.30	+ .17	0.047	14.73	+ .43
3	0.071	15.50	+ .18	0.076	15.61	+ .23	0.084	15.19	+ .25	0.078	15.47	+ .20	0.071	15.16	+ .46
4	0.095	15.68	+ .20	0.101	15.84	+ .19	0.111	15.44	+ .18	0.103	15.67	+ .18	0.095	15.62	+ .29
5	0.119	15.88	+ .20	0.126	16.03	+ .16	0.139	15.62	+ .14	0.129	15.85	+ .21	0.118	15.91	+ .22
6	0.143	16.08	+ .15	0.151	16.19	+ .12	0.167	15.76	+ .12	0.155	16.06	+ .13	0.142	16.13	+ .15
7	0.166	16.23	+ .15	0.177	16.31	+ .08	0.195	15.88	+ .11	0.181	16.19	+ .07	0.166	16.28	+ .11
8	0.190	16.38	+ .08	0.202	16.39	+ .07	0.223	15.99	+ .10	0.207	16.26	+ .06	0.189	16.39	+ .09
9	0.214	16.46	+ .06	0.227	16.46	+ .06	0.251	16.09	+ .08	0.233	16.32	+ .04	0.213	16.48	+ .09
10	0.238	16.52	+ .05	0.252	16.52	+ .05	0.278	16.17	+ .09	0.258	16.36	+ .04	0.237	16.57	+ .05
11	0.261	16.57	+ .02	0.278	16.57	+ .03	0.306	16.26	+ .08	0.284	16.40	+ .02	0.261	16.62	+ .03
12	0.285	16.59	+ .01	0.303	16.60	+ .02	0.334	16.34	+ .08	0.310	16.42	+ .01	0.284	16.65	+ .03
13	0.309	16.60	+ .01	0.328	16.62	+ .01	0.362	16.42	+ .05	0.336	16.43	+ .01	0.308	16.68	+ .02
14	0.333	16.61	+ .01	0.353	16.63	.00	0.390	16.47	+ .04	0.362	16.44	+ .01	0.332	16.70	.00
15	0.357	16.62	.00	0.378	16.63	.00	0.418	16.51	+ .04	0.388	16.45	+ .01	0.355	16.70	.00
16	0.380	16.62	.00	0.404	16.63	+ .01	0.446	16.55	+ .02	0.414	16.46	.00	0.379	16.70	.00
17	0.404	16.62	.00	0.429	16.64	− .02	0.473	16.57	+ .02	0.440	16.46	− .01	0.403	16.70	.00
18	0.428	16.62	.00	0.454	16.62	− .03	0.501	16.59	+ .01	0.465	16.45	− .03	0.426	16.70	− .01
19	0.452	16.62	.00	0.479	16.59	− .11	0.529	16.60	.00	0.491	16.42	− .05	0.450	16.69	− .01
20	0.475	16.62	.00	0.505	16.48	− .21	0.557	16.60	− .01	0.517	16.37	− .18	0.474	16.68	− .07
21	0.499	16.62	− .57	0.530	16.27	− .46	0.585	16.59	− .18	0.543	16.19	− .50	0.497	16.61	− .69
22	0.523	16.05	− .97	0.555	15.81	− .54	0.613	16.41	−1.51	0.569	15.69	− .50	0.521	15.92	−1.31
23	0.547	15.08	− .38	0.580	15.27	− .27	0.641	14.90	− .41	0.594	15.19	− .18	0.545	14.61	− .09

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 68			No. 69			No. 71			No. 72			No. 74		
	d.			d.			d.			d.			d.		
0	0.000	15.00	− .07	0.000	14.99	+ .03	0.000	14.91	+ .21	0.000	14.40	+ .08	0.000	14.73	+ .09
1	0.022	14.93	− .04	0.024	15.02	+ .07	0.023	15.12	+ .29	0.019	14.48	+ .18	0.021	14.82	+ .17
2	0.043	14.89	.00	0.047	15.09	+ .13	0.046	15.41	+ .31	0.038	14.66	+ .23	0.041	14.99	+ .29
3	0.065	14.89	+ .10	0.071	15.22	+ .12	0.069	15.72	+ .27	0.057	14.89	+ .32	0.062	15.28	+ .28
4	0.086	14.99	+ .20	0.094	15.34	+ .19	0.092	15.99	+ .17	0.076	15.21	+ .40	0.082	15.56	+ .34
5	0.108	15.19	+ .22	0.118	15.53	+ .29	0.114	16.16	+ .15	0.095	15.61	+ .38	0.103	15.90	+ .28
6	0.130	15.41	+ .27	0.142	15.82	+ .28	0.137	16.31	+ .11	0.114	15.99	+ .30	0.123	16.18	+ .22
7	0.151	15.68	+ .21	0.165	16.10	+ .24	0.160	16.42	+ .08	0.133	16.29	+ .21	0.144	16.40	+ .15
8	0.173	15.89	+ .13	0.189	16.34	+ .17	0.183	16.50	+ .04	0.152	16.50	+ .14	0.164	16.55	+ .11
9	0.195	16.02	+ .09	0.212	16.51	+ .07	0.206	16.54	+ .04	0.171	16.64	+ .08	0.185	16.66	+ .07
10	0.216	16.11	+ .03	0.236	16.58	+ .03	0.229	16.58	+ .03	0.190	16.72	+ .06	0.205	16.73	+ .04
11	0.238	16.14	+ .02	0.260	16.61	+ .02	0.252	16.61	+ .03	0.209	16.78	+ .03	0.226	16.77	+ .01
12	0.259	16.16	+ .02	0.283	16.63	+ .02	0.275	16.64	+ .02	0.228	16.81	+ .02	0.246	16.78	.00
13	0.281	16.18	+ .01	0.307	16.65	+ .01	0.298	16.66	+ .01	0.247	16.83	+ .03	0.267	16.78	.00
14	0.303	16.19	.00	0.330	16.66	.00	0.320	16.67	.00	0.266	16.86	+ .01	0.287	16.78	.00
15	0.324	16.19	+ .01	0.354	16.66	+ .01	0.343	16.67	.00	0.285	16.87	+ .02	0.308	16.78	.00
16	0.346	16.20	.00	0.378	16.67	− .01	0.366	16.67	− .01	0.304	16.89	+ .01	0.328	16.78	+ .01
17	0.368	16.20	+ .01	0.401	16.66	.00	0.389	16.66	− .02	0.323	16.90	.00	0.349	16.79	.00
18	0.389	16.21	.00	0.425	16.66	− .04	0.412	16.64	− .02	0.342	16.90	.00	0.369	16.79	.00
19	0.411	16.21	− .02	0.448	16.62	− .22	0.435	16.62	− .14	0.361	16.90	.00	0.390	16.79	.00
20	0.432	16.19	− .08	0.472	16.40	− .52	0.458	16.48	− .58	0.380	16.90	− .02	0.410	16.79	− .02
21	0.454	16.11	− .27	0.496	15.88	− .56	0.481	15.90	− .55	0.399	16.88	−1.48	0.431	16.77	− .15
22	0.476	15.84	− .76	0.519	15.32	− .25	0.503	15.35	− .31	0.418	15.40	− .81	0.451	16.62	−1.78
23	0.497	15.08	− .08	0.543	15.07	− .08	0.526	15.04	− .13	0.437	14.59	− .19	0.472	14.84	− .11
	No. 76			No. 77			No. 78			No. 79			No. 80		
	d.			d.			d.			d.			d.		
0	0.000	14.24	+ .12	0.000	14.60	+ .04	0.000	14.43	+ .20	0.000	14.70	+ .10	0.000	14.74	+ .04
1	0.021	14.36	+ .24	0.019	14.64	+ .12	0.026	14.63	+ .27	0.020	14.80	+ .18	0.022	14.78	+ .10
2	0.042	14.60	+ .32	0.038	14.76	+ .16	0.051	14.90	+ .33	0.040	14.98	+ .20	0.045	14.88	+ .14
3	0.063	14.92	+ .32	0.057	14.92	+ .24	0.076	15.23	+ .42	0.060	15.18	+ .20	0.067	15.02	+ .18
4	0.084	15.24	+ .28	0.077	15.16	+ .25	0.102	15.65	+ .28	0.081	15.38	+ .15	0.090	15.20	+ .21
5	0.105	15.52	+ .23	0.096	15.41	+ .33	0.128	15.93	+ .19	0.101	15.53	+ .17	0.112	15.41	+ .19
6	0.125	15.75	+ .19	0.115	15.74	+ .27	0.153	16.12	+ .16	0.121	15.70	+ .13	0.135	15.60	+ .20
7	0.146	15.94	+ .17	0.134	16.01	+ .25	0.180	16.28	+ .09	0.141	15.83	+ .15	0.157	15.80	+ .23
8	0.167	16.11	+ .13	0.153	16.26	+ .17	0.204	16.37	+ .06	0.161	15.98	+ .13	0.180	16.03	+ .19
9	0.188	16.24	+ .12	0.172	16.43	+ .16	0.230	16.43	+ .03	0.181	16.11	+ .13	0.202	16.22	+ .17
10	0.209	16.36	+ .13	0.191	16.59	+ .13	0.255	16.46	+ .02	0.202	16.24	+ .09	0.225	16.39	+ .11
11	0.230	16.49	+ .08	0.211	16.72	+ .07	0.282	16.48	+ .00	0.222	16.33	+ .10	0.247	16.50	+ .08

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 76			No. 77			No. 78			No. 79			No. 80		
	d.			d.			d.			d.			d.		
12	0.251	16.57	+ .09	0.230	16.79	+ .05	0.306	16.48	+ .01	0.242	16.43	+ .09	0.269	16.58	+ .07
13	0.272	16.66	+ .05	0.249	16.84	+ .04	0.332	16.49	+ .01	0.262	16.52	+ .09	0.292	16.65	+ .04
14	0.293	16.71	+ .02	0.268	16.88	+ .03	0.357	16.50	+ .01	0.282	16.61	+ .06	0.315	16.69	.00
15	0.314	16.73	+ .02	0.287	16.91	.00	0.384	16.51	+ .01	0.302	16.67	+ .01	0.337	16.69	+ .01
16	0.334	16.75	.00	0.306	16.91	.00	0.408	16.52	+ .00	0.323	16.68	.00	0.360	16.70	.00
17	0.355	16.75	+ .01	0.325	16.91	.00	0.434	16.52	.00	0.343	16.68	− .01	0.382	16.70	− .01
18	0.376	16.76	.00	0.345	16.91	− .02	0.459	16.52	.00	0.363	16.67	− .03	0.405	16.69	− .01
19	0.397	16.76	+ .01	0.364	16.89	− .13	0.486	16.52	− .52	0.383	16.64	− .08	0.427	16.68	− .04
20	0.418	16.77	− .01	0.383	16.76	− .44	0.510	16.00	− .70	0.403	16.56	− .13	0.450	16.64	−1.10
21	0.439	16.76	− .03	0.402	16.32	− .74	0.536	15.30	− .44	0.423	16.43	− .51	0.472	15.54	− .45
22	0.460	16.73	− .63	0.421	15.58	− .68	0.561	14.86	− .24	0.444	15.92	− .98	0.494	15.09	− .25
23	0.481	16.10	−1.86	0.440	14.90	− .30	0.586	14.62	− .19	0.464	14.94	− .24	0.517	14.84	− .10
	No. 81			No. 82			No. 83			No. 84			No. 86		
	d.			d.			d.			d.			d.		
0	0.000	14.76	+ .02	0.000	14.89	− .03	0.000	14.57	− .03	0.000	14.82	+ .12	0.000	15.04	+ .03
1	0.022	14.78	+ .06	0.022	14.86	+ .01	0.021	14.54	+ .03	0.025	14.94	+ .45	0.017	15.07	+ .03
2	0.044	14.84	+ .15	0.044	14.87	+ .05	0.042	14.57	+ .09	0.050	15.39	+ .33	0.035	15.10	+ .05
3	0.066	14.99	+ .19	0.066	14.92	+ .10	0.063	14.66	+ .11	0.074	15.72	+ .21	0.052	15.15	+ .04
4	0.088	15.18	+ .24	0.088	15.02	+ .15	0.084	14.77	+ .13	0.099	15.93	+ .16	0.069	15.19	+ .07
5	0.110	15.42	+ .29	0.109	15.17	+ .25	0.104	14.90	+ .17	0.124	16.09	+ .09	0.086	15.26	+ .08
6	0.132	15.71	+ .26	0.131	15.42	+ .48	0.125	15.07	+ .20	0.149	16.18	+ .09	0.104	15.34	+ .10
7	0.154	15.97	+ .24	0.153	15.90	+ .47	0.146	15.27	+ .23	0.174	16.27	+ .06	0.121	15.44	+ .10
8	0.176	16.21	+ .16	0.175	16.37	+ .25	0.167	15.50	+ .26	0.199	16.33	+ .07	0.138	15.54	+ .15
9	0.198	16.37	+ .13	0.197	16.62	+ .12	0.188	15.76	+ .24	0.223	16.40	+ .04	0.155	15.69	+ .21
10	0.220	16.50	+ .09	0.219	16.74	+ .06	0.209	16.00	+ .24	0.248	16.44	+ .04	0.172	15.90	+ .28
11	0.243	16.59	+ .07	0.241	16.80	+ .03	0.230	16.24	+ .27	0.273	16.48	+ .04	0.190	16.18	+ .18
12	0.265	16.66	+ .04	0.263	16.83	+ .03	0.251	16.51	+ .21	0.298	16.52	+ .02	0.207	16.36	+ .13
13	0.287	16.70	+ .03	0.285	16.86	+ .01	0.272	16.72	+ .07	0.323	16.54	+ .04	0.224	16.49	+ .05
14	0.309	16.73	+ .03	0.306	16.87	.00	0.293	16.79	+ .03	0.347	16.58	+ .02	0.242	16.54	+ .02
15	0.331	16.76	+ .01	0.328	16.87	+ .01	0.313	16.82	+ .02	0.372	16.60	.00	0.259	16.56	+ .02
16	0.353	16.77	− .01	0.350	16.88	.00	0.334	16.84	.00	0.397	16.60	.00	0.276	16.58	.00
17	0.375	16.76	− .01	0.372	16.88	.00	0.355	16.84	.00	0.422	16.60	.00	0.293	16.58	.00
18	0.397	16.75	− .03	0.394	16.88	− .01	0.376	16.84	.00	0.447	16.60	.00	0.311	16.58	.00
19	0.419	16.72	− .08	0.416	16.87	− .01	0.397	16.84	− .01	0.472	16.60	− .02	0.328	16.58	− .01
20	0.441	16.64	− .14	0.438	16.86	− .23	0.418	16.83	− .05	0.496	16.58	− .18	0.345	16.57	− .06
21	0.463	16.50	− .42	0.460	16.63	−1.24	0.439	16.78	−1.82	0.521	16.40	− .79	0.362	16.51	−1.09
22	0.485	16.08	−1.30	0.481	15.39	− .37	0.460	14.96	− .27	0.546	15.61	− .52	0.380	15.42	− .32
23	0.507	14.78	− .02	0.503	15.02	− .13	0.481	14.69	− .12	0.571	15.09	− .27	0.397	15.10	− .06

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 88			No. 89			No. 90			No. 91			No. 92		
	d.			d.			d.			d.			d.		
0	0.000	14.68	+ .09	0.000	14.47	+ .21	0.000	14.64	+ .23	0.000	14.85	+ .04	0.000	14.75	+ .05
1	0.027	14.77	+ .27	0.023	14.68	+ .27	0.022	14.87	+ .25	0.022	14.89	+ .13	0.021	14.80	+ .14
2	0.055	15.04	+ .22	0.046	14.95	+ .26	0.043	15.12	+ .25	0.044	15.02	+ .28	0.042	14.94	+ .16
3	0.082	15.26	+ .18	0.069	15.21	+ .25	0.065	15.37	+ .23	0.066	15.30	+ .32	0.063	15.10	+ .21
4	0.109	15.44	+ .18	0.091	15.46	+ .20	0.086	15.60	+ .21	0.088	15.62	+ .21	0.084	15.31	+ .23
5	0.136	15.62	+ .14	0.114	15.66	+ .15	0.108	15.81	+ .20	0.110	15.83	+ .18	0.105	15.54	+ .32
6	0.164	15.76	+ .08	0.137	15.81	+ .16	0.129	16.01	+ .16	0.133	16.01	+ .15	0.126	15.86	+ .28
7	0.191	15.84	+ .05	0.160	15.97	+ .14	0.151	16.17	+ .15	0.155	16.16	+ .10	0.147	16.14	+ .24
8	0.218	15.89	+ .05	0.183	16.11	+ .11	0.172	16.32	+ .15	0.177	16.26	+ .09	0.168	16.38	+ .16
9	0.245	15.94	+ .04	0.206	16.22	+ .09	0.194	16.47	+ .09	0.199	16.35	+ .10	0.189	16.54	+ .15
10	0.273	15.98	+ .02	0.228	16.31	+ .09	0.215	16.56	+ .06	0.221	16.45	+ .07	0.210	16.69	+ .07
11	0.300	16.00	+ .02	0.251	16.40	+ .06	0.237	16.62	+ .04	0.243	16.52	+ .05	0.231	16.76	+ .05
12	0.327	16.02	+ .01	0.274	16.46	+ .05	0.258	16.66	+ .01	0.265	16.57	+ .05	0.252	16.81	+ .02
13	0.354	16.03	+ .01	0.297	16.51	+ .03	0.280	16.67	.00	0.287	16.62	+ .04	0.273	16.83	+ .01
14	0.382	16.04	.00	0.320	16.54	+ .03	0.301	16.67	.00	0.309	16.66	+ .04	0.294	16.84	+ .01
15	0.409	16.04	+ .01	0.343	16.57	+ .02	0.323	16.67	.00	0.331	16.70	+ .03	0.315	16.85	.00
16	0.436	16.05	+ .01	0.365	16.59	+ .02	0.344	16.67	.00	0.353	16.73	+ .02	0.336	16.85	.00
17	0.463	16.06	+ .01	0.388	16.61	+ .02	0.366	16.67	.00	0.376	16.75	+ .01	0.357	16.85	.00
18	0.491	16.07	.00	0.411	16.63	+ .01	0.387	16.67	− .01	0.398	16.76	+ .01	0.378	16.85	− .01
19	0.518	16.07	− .02	0.434	16.64	+ .01	0.409	16.66	− .01	0.420	16.77	.00	0.399	16.84	.00
20	0.545	16.05	− .06	0.457	16.65	− .03	0.430	16.65	− .11	0.442	16.77	− .02	0.420	16.84	− .02
21	0.572	15.99	− .59	0.480	16.62	− .74	0.452	16.54	− .74	0.464	16.75	− .03	0.441	16.82	− .30
22	0.600	15.40	− .48	0.502	15.88	−1.18	0.473	15.80	−1.10	0.486	16.72	− .25	0.462	16.52	−1.22
23	0.627	14.92	− .24	0.525	14.70	− .23	0.495	14.70	− .06	0.508	16.47	−1.62	0.483	15.30	− .55
	No. 93			No. 94			No. 96			No. 97			No. 100		
	d.			d.			d.			d.			d.		
0	0.000	15.03	+ .03	0.000	14.65	+ .18	0.000	14.36	+ .14	0.000	15.36	+ .02	0.000	15.54	+ .08
1	0.025	15.06	+ .11	0.022	14.83	+ .25	0.021	14.50	+ .22	0.021	15.38	+ .05	0.023	15.62	+ .12
2	0.050	15.17	+ .22	0.044	15.08	+ .29	0.042	14.72	+ .20	0.042	15.43	+ .05	0.047	15.74	+ .11
3	0.075	15.39	+ .40	0.065	15.37	+ .31	0.062	14.92	+ .26	0.063	15.48	+ .06	0.070	15.85	+ .11
4	0.100	15.79	+ .47	0.087	15.68	+ .38	0.083	15.18	+ .19	0.084	15.54	+ .05	0.093	15.96	+ .13
5	0.125	16.26	+ .27	0.109	16.06	+ .27	0.104	15.37	+ .19	0.105	15.59	+ .07	0.116	16.09	+ .14
6	0.151	16.53	+ .10	0.131	16.33	+ .19	0.125	15.56	+ .21	0.126	15.66	+ .05	0.140	16.23	+ .14
7	0.176	16.63	+ .03	0.153	16.52	+ .10	0.146	15.77	+ .16	0.147	15.71	+ .07	0.163	16.37	+ .09
8	0.201	16.66	+ .02	0.175	16.62	+ .08	0.166	15.93	+ .18	0.168	15.78	+ .08	0.186	16.46	+ .08
9	0.226	16.68	+ .01	0.196	16.70	+ .07	0.188	16.11	+ .13	0.189	15.86	+ .08	0.209	16.54	+ .06
10	0.251	16.69	+ .01	0.218	16.77	+ .06	0.208	16.24	+ .15	0.210	15.94	+ .08	0.233	16.60	+ .02
11	0.276	16.70	.00	0.240	16.83	+ .02	0.229	16.39	+ .10	0.231	16.02	+ .08	0.256	16.62	+ .04

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 93			No. 94			No. 96			No. 97			No. 100		
	d.			d.			d.			d.			d.		
12	0.301	16.70	.00	0.262	16.85	+ .02	0.250	16.49	+ .08	0.252	16.10	+ .08	0.279	16.66	+ .02
13	0.326	16.70	.00	0.284	16.87	.00	0.271	16.57	+ .03	0.273	16.18	+ .08	0.302	16.68	+ .02
14	0.351	16.70	.00	0.305	16.87	+ .01	0.291	16.60	+ .03	0.294	16.26	+ .05	0.326	16.70	.00
15	0.376	16.70	.00	0.327	16.88	.00	0.312	16.63	+ .04	0.315	16.31	+ .05	0.349	16.70	.00
16	0.402	16.70	.00	0.349	16.88	+ .01	0.333	16.67	+ .02	0.336	16.36	+ .03	0.372	16.70	− .02
17	0.427	16.70	.00	0.371	16.89	.00	0.354	16.69	+ .01	0.357	16.39	.00	0.395	16.68	− .08
18	0.452	16.70	− .50	0.393	16.89	.00	0.375	16.70	+ .01	0.378	16.39	− .11	0.419	16.60	− .12
19	0.477	16.20	− .84	0.415	16.89	.00	0.395	16.71	+ .02	0.399	16.28	− .17	0.442	16.48	− .28
20	0.502	15.36	− .16	0.436	16.89	− .15	0.416	16.73	.00	0.420	16.11	− .20	0.465	16.20	− .24
21	0.527	15.20	− .11	0.458	16.74	−1.31	0.437	16.73	− .61	0.441	15.91	− .20	0.488	15.96	− .23
22	0.552	15.09	− .04	0.480	15.43	− .69	0.458	16.12	−1.66	0.462	15.71	− .20	0.512	15.73	− .11
23	0.577	15.05	− .02	0.502	14.74	− .09	0.479	14.46	− .10	0.483	15.51	− .15	0.535	15.62	− .08
	No. 101			No. 104			No. 106			No. 107			No. 108		
	d.			d.			d.			d.			d.		
0	0.000	15.20	+ .14	0.000	14.60	+ .12	0.000	14.84	+ .09	0.000	14.95	+ .09	0.000	14.75	+ .08
1	0.027	15.34	+ .16	0.024	14.72	+ .22	0.023	14.93	+ .19	0.019	15.04	+ .12	0.022	14.83	+ .11
2	0.054	15.50	+ .17	0.048	14.94	+ .24	0.046	15.12	+ .22	0.037	15.16	+ .14	0.043	14.94	+ .16
3	0.080	15.67	+ .15	0.071	15.18	+ .29	0.068	15.34	+ .25	0.056	15.30	+ .14	0.065	15.10	+ .16
4	0.107	15.82	+ .15	0.095	15.47	+ .24	0.091	15.59	+ .21	0.075	15.44	+ .14	0.087	15.26	+ .16
5	0.134	15.97	+ .10	0.119	15.71	+ .25	0.114	15.80	+ .22	0.093	15.58	+ .14	0.108	15.42	+ .24
6	0.161	16.07	+ .10	0.143	15.96	+ .18	0.137	16.02	+ .21	0.112	15.72	+ .13	0.130	15.66	+ .28
7	0.188	16.17	+ .07	0.166	16.14	+ .14	0.160	16.23	+ .14	0.130	15.85	+ .10	0.152	15.94	+ .22
8	0.215	16.24	+ .07	0.190	16.28	+ .13	0.182	16.37	+ .10	0.149	15.95	+ .10	0.173	16.16	+ .16
9	0.241	16.31	+ .06	0.214	16.41	+ .07	0.205	16.47	+ .05	0.168	16.05	+ .07	0.195	16.32	+ .16
10	0.268	16.37	+ .04	0.238	16.48	+ .07	0.228	16.52	+ .02	0.186	16.12	+ .07	0.216	16.48	+ .12
11	0.295	16.41	+ .02	0.262	16.55	+ .05	0.251	16.54	+ .03	0.205	16.19	+ .05	0.238	16.60	+ .07
12	0.322	16.43	+ .04	0.285	16.60	+ .04	0.274	16.57	+ .02	0.224	16.24	+ .06	0.260	16.67	+ .03
13	0.349	16.47	.00	0.309	16.64	+ .03	0.296	16.59	+ .01	0.242	16.30	+ .04	0.281	16.70	+ .02
14	0.376	16.47	.00	0.333	16.67	+ .02	0.319	16.60	+ .03	0.261	16.34	+ .03	0.303	16.72	+ .01
15	0.402	16.47	.00	0.357	16.69	+ .01	0.342	16.63	+ .02	0.280	16.37	+ .01	0.325	16.73	+ .01
16	0.429	16.47	.00	0.381	16.70	.00	0.365	16.65	+ .02	0.298	16.38	+ .01	0.346	16.74	.00
17	0.456	16.47	− .03	0.404	16.70	.00	0.388	16.67	+ .01	0.317	16.39	− .01	0.368	16.74	.00
18	0.483	16.44	− .10	0.428	16.70	.00	0.410	16.68	+ .02	0.335	16.38	− .04	0.390	16.74	− .01
19	0.510	16.34	− .31	0.452	16.70	− .04	0.433	16.70	.00	0.354	16.34	− .32	0.411	16.73	.00
20	0.537	16.03	− .44	0.476	16.66	− .19	0.456	16.70	− .01	0.373	16.02	− .74	0.433	16.73	.00
21	0.564	15.59	− .21	0.499	16.47	−1.22	0.479	16.69	− .46	0.391	15.28	− .26	0.454	16.73	− .06
22	0.590	15.38	− .13	0.523	15.25	− .64	0.502	16.23	−1.29	0.410	15.02	− .09	0.476	16.67	−1.87
23	0.617	15.25	− .05	0.547	14.61	− .01	0.524	14.94	− .10	0.429	14.93	+ .02	0.498	14.80	− .05

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 109			No. 110			No. 111			No. 113			No. 114		
	d.			d.			d.			d.			d.		
0	0.000	14.84	+ .04	0.000	14.70	+ .03	0.000	14.83	+ .05	0.000	14.50	+ .13	0.000	15.00	+ .06
1	0.022	14.88	+ .11	0.022	14.73	+ .10	0.021	14.88	+ .13	0.022	14.63	+ .32	0.025	15.06	+ .10
2	0.044	14.99	+ .15	0.044	14.83	+ .17	0.043	15.01	+ .19	0.043	14.95	+ .37	0.050	15.16	+ .14
3	0.067	15.14	+ .18	0.067	15.00	+ .24	0.064	15.20	+ .20	0.065	15.32	+ .39	0.075	15.30	+ .20
4	0.089	15.32	+ .19	0.089	15.24	+ .27	0.086	15.40	+ .22	0.086	15.71	+ .32	0.100	15.50	+ .25
5	0.111	15.51	+ .21	0.111	15.51	+ .23	0.107	15.62	+ .21	0.108	16.03	+ .28	0.125	15.75	+ .25
6	0.133	15.72	+ .20	0.134	15.74	+ .20	0.128	15.83	+ .17	0.129	16.31	+ .21	0.149	16.00	+ .26
7	0.156	15.92	+ .20	0.156	15.94	+ .14	0.150	16.00	+ .17	0.151	16.52	+ .09	0.174	16.26	+ .14
8	0.178	16.12	+ .18	0.178	16.08	+ .12	0.171	16.17	+ .10	0.173	16.61	+ .07	0.199	16.40	+ .08
9	0.200	16.30	+ .16	0.201	16.20	+ .05	0.192	16.27	+ .07	0.194	16.68	+ .05	0.224	16.48	+ .07
10	0.222	16.46	+ .11	0.223	16.25	+ .05	0.214	16.34	+ .06	0.216	16.73	+ .05	0.249	16.55	+ .05
11	0.245	16.57	+ .07	0.245	16.30	+ .03	0.235	16.40	+ .01	0.237	16.78	+ .03	0.274	16.60	+ .04
12	0.267	16.64	+ .06	0.268	16.33	+ .04	0.257	16.41	+ .01	0.259	16.81	+ .02	0.299	16.64	+ .04
13	0.289	16.70	+ .02	0.290	16.37	+ .02	0.278	16.42	.00	0.281	16.83	+ .02	0.324	16.68	+ .02
14	0.312	16.72	+ .03	0.312	16.39	+ .01	0.299	16.42	+ .01	0.302	16.85	+ .01	0.349	16.70	.00
15	0.334	16.75	+ .01	0.335	16.40	+ .02	0.321	16.43	.00	0.324	16.86	+ .01	0.374	16.70	+ .01
16	0.356	16.76	+ .01	0.357	16.42	+ .01	0.342	16.43	.00	0.345	16.87	.00	0.398	16.71	.00
17	0.378	16.77	.00	0.379	16.43	+ .01	0.363	16.43	− .01	0.367	16.87	+ .01	0.423	16.71	.00
18	0.400	16.77	.00	0.402	16.44	+ .01	0.385	16.42	− .02	0.388	16.88	.00	0.448	16.71	.00
19	0.423	16.77	− .03	0.424	16.45	.00	0.406	16.40	− .04	0.410	16.88	.00	0.473	16.71	− .02
20	0.445	16.74	− .14	0.446	16.45	− .06	0.428	16.36	− .11	0.432	16.88	.00	0.498	16.69	− .39
21	0.467	16.60	− .69	0.469	16.39	− .19	0.449	16.25	− .17	0.453	16.88	− .06	0.523	16.30	− .90
22	0.489	15.91	− .85	0.491	16.20	− .80	0.470	16.08	− .88	0.475	16.82	−1.62	0.548	15.40	− .28
23	0.512	15.06	− .22	0.513	15.40	− .70	0.492	15.20	− .37	0.496	15.20	− .70	0.573	15.12	− .12

	No. 115			No. 116			No. 117			No. 118			No. 119		
	d.			d.			d.			d.			d.		
0	0.000	14.52	+ .02	0.000	14.45	+ .08	0.000	15.23	+ .03	0.000	14.70	+ .06	0.000	14.20	+ .07
1	0.021	14.54	+ .10	0.021	14.53	+ .26	0.025	15.26	+ .07	0.021	14.76	+ .21	0.022	14.27	+ .15
2	0.043	14.64	+ .15	0.043	14.79	+ .28	0.050	15.33	+ .12	0.042	14.97	+ .20	0.043	14.42	+ .17
3	0.064	14.79	+ .21	0.064	15.07	+ .30	0.075	15.45	+ .23	0.062	15.17	+ .21	0.065	14.59	+ .32
4	0.086	15.00	+ .30	0.086	15.37	+ .30	0.100	15.68	+ .28	0.083	15.38	+ .21	0.086	14.91	+ .41
5	0.107	15.30	+ .40	0.107	15.67	+ .27	0.125	15.96	+ .23	0.104	15.59	+ .21	0.108	15.32	+ .37
6	0.129	15.70	+ .32	0.129	15.94	+ .23	0.150	16.19	+ .18	0.125	15.80	+ .20	0.129	15.69	+ .35
7	0.150	16.02	+ .22	0.150	16.17	+ .15	0.175	16.37	+ .11	0.146	16.00	+ .22	0.151	16.04	+ .22
8	0.171	16.24	+ .17	0.172	16.32	+ .08	0.200	16.48	+ .08	0.166	16.22	+ .20	0.173	16.26	+ .12
9	0.193	16.41	+ .10	0.193	16.40	+ .05	0.225	16.56	+ .09	0.187	16.42	+ .15	0.194	16.38	+ .09
10	0.214	16.51	+ .07	0.214	16.45	+ .05	0.250	16.65	+ .05	0.208	16.57	+ .13	0.216	16.47	+ .05
11	0.236	16.58	+ .06	0.236	16.50	+ .05	0.275	16.70	+ .04	0.229	16.70	+ .06	0.237	16.52	+ .07

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 115			No. 116			No. 117			No. 118			No. 119		
	d.			d.			d.			d.			d.		
12	0.257	16.64	+ .05	0.257	16.55	+ .04	0.300	16.74	+ .02	0.250	16.76	+ .03	0.259	16.59	+ .04
13	0.279	16.69	+ .04	0.279	16.59	+ .03	0.325	16.76	.00	0.270	16.79	+ .03	0.280	16.63	+ .04
14	0.300	16.73	+ .02	0.300	16.62	+ .04	0.350	16.76	.00	0.291	16.82	+ .01	0.302	16.67	+ .02
15	0.321	16.75	+ .02	0.322	16.66	+ .02	0.375	16.76	+ .01	0.312	16.83	+ .02	0.324	16.69	+ .01
16	0.343	16.77	.00	0.343	16.68	+ .02	0.400	16.77	+ .01	0.333	16.85	+ .01	0.345	16.70	.00
17	0.364	16.77	.00	0.365	16.70	.00	0.425	16.78	.00	0.354	16.86	+ .01	0.367	16.70	.00
18	0.386	16.77	.00	0.386	16.70	.00	0.450	16.78	.00	0.375	16.87	− .03	0.388	16.70	.00
19	0.407	16.77	− .02	0.408	16.70	− .07	0.475	16.78	− .02	0.395	16.84	− .10	0.410	16.70	.00
20	0.429	16.75	− .11	0.429	16.63	− .23	0.500	16.76	− .43	0.416	16.74	− .11	0.431	16.70	.00
21	0.450	16.64	− .82	0.450	16.40	− .43	0.525	16.33	− .61	0.437	16.63	− .21	0.453	16.70	− .10
22	0.471	15.82	−1.16	0.472	15.97	− .68	0.550	15.72	− .31	0.458	16.42	− .92	0.475	16.60	−1.22
23	0.493	14.66	− .14	0.493	15.29	− .84	0.576	15.41	− .18	0.479	15.50	− .80	0.496	15.38	−1.18
	No. 121			No. 123			No. 125			No. 126			No. 128		
	d.			d.			d.			d.			d.		
0	0.000	14.85	+ .02	0.000	14.89	+ .07	0.000	15.30	+ .02	0.000	15.29	+ .04	0.000	14.99	+ .04
1	0.021	14.87	+ .10	0.023	14.96	+ .14	0.022	15.32	+ .12	0.22	15.33	+ .11	0.025	15.03	+ .10
2	0.041	14.97	+ .14	0.045	15.10	+ .24	0.045	15.44	+ .10	0.045	15.44	+ .16	0.050	15.13	+ .13
3	0.062	15.11	+ .20	0.068	15.34	+ .28	0.067	15.54	+ .17	0.067	15.60	+ .21	0.076	15.26	+ .23
4	0.082	15.31	+ .23	0.091	15.62	+ .39	0.090	15.71	+ .18	0.089	15.81	+ .20	0.101	15.49	+ .25
5	0.103	15.54	+ .30	0.114	16.01	+ .28	0.112	15.89	+ .19	0.112	16.01	+ .11	0.126	15.74	+ .35
6	0.123	15.84	+ .25	0.136	16.29	+ .23	0.135	16.08	+ .16	0.134	16.12	+ .08	0.151	16.09	+ .21
7	0.144	16.09	+ .19	0.159	16.52	+ .18	0.157	16.24	+ .14	0.156	16.20	+ .04	0.177	16.30	+ .14
8	0.164	16.28	+ .14	0.182	16.70	+ .11	0.180	16.38	+ .08	0.178	16.24	+ .01	0.202	16.44	+ .05
9	0.185	16.42	+ .07	0.205	16.81	+ .05	0.202	16.46	+ .03	0.201	16.25	.00	0.227	16.49	+ .01
10	0.205	16.49	+ .05	0.227	16.86	+ .03	0.224	16.49	+ .01	0.223	16.25	.00	0.252	16.50	.00
11	0.226	16.54	+ .02	0.250	16.89	+ .01	0.247	16.50	.00	0.245	16.25	+ .01	0.278	16.50	.00
12	0.247	16.56	+ .01	0.273	16.90	.00	0.269	16.50	.00	0.268	16.26	.00	0.303	16.50	.00
13	0.267	16.57	.00	0.296	16.90	.00	0.292	16.50	.00	0.290	16.26	− .01	0.328	16.50	.00
14	0.288	16.57	+ .01	0.318	16.90	+ .01	0.314	16.50	.00	0.312	16.25	− .01	0.353	16.50	.00
15	0.308	16.58	− .01	0.341	16.91	.00	0.337	16.50	.00	0.335	16.24	.00	0.378	16.50	.00
16	0.329	16.57	− .02	0.364	16.91	.00	0.359	16.50	− .01	0.357	16.24	.00	0.404	16.50	.00
17	0.349	16.55	− .05	0.386	16.91	.00	0.382	16.49	− .02	0.379	16.24	− .01	0.429	16.50	.00
18	0.370	16.50	− .08	0.409	16.91	− .01	0.404	16.47	− .12	0.402	16.23	− .03	0.454	16.50	− .06
19	0.390	16.42	− .14	0.432	16.90	− .05	0.427	16.35	− .38	0.424	16.20	− .17	0.479	16.44	− .22
20	0.411	16.28	− .23	0.455	16.85	− .11	0.449	15.97	− .29	0.446	16.03	− .34	0.505	16.22	− .32
21	0.431	16.05	− .30	0.477	16.74	− .71	0.471	15.68	− .22	0.469	15.69	− .20	0.530	15.90	− .51
22	0.452	15.75	− .65	0.500	16.03	−1.01	0.494	15.46	− .12	0.491	15.49	− .11	0.555	15.39	− .25
23	0.472	15.10	− .25	0.523	15.02	− .13	0.516	15.34	− .04	0.513	15.38	− .09	0.580	15.14	− .15

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 131			No. 132			No. 133			No. 134			No. 137		
	d.			d.			d.			d.			d.		
0	0.000	14.89	+ .03	0.000	14.90	+ .05	0.000	14.70	+ .01	0.000	15.19	+ .03	0.000	14.65	+ .15
1	0.018	14.92	+ .07	0.021	14.95	+ .14	0.023	14.71	+ .04	0.026	15.22	+ .09	0.024	14.80	+ .24
2	0.036	14.99	+ .08	0.042	15.09	+ .14	0.046	14.75	+ .07	0.051	15.31	+ .12	0.048	15.04	+ .29
3	0.055	15.07	+ .06	0.063	15.23	+ .16	0.069	14.82	+ .11	0.077	15.43	+ .19	0.072	15.33	+ .21
4	0.073	15.13	+ .12	0.084	15.39	+ .20	0.092	14.93	+ .10	0.103	15.62	+ .18	0.096	15.54	+ .19
5	0.091	15.25	+ .12	0.106	15.59	+ .19	0.115	15.03	+ .15	0.129	15.80	+ .19	0.120	15.73	+ .14
6	0.109	15.37	+ .10	0.127	15.78	+ .14	0.138	15.18	+ .20	0.154	15.99	+ .17	0.144	15.87	+ .14
7	0.127	15.47	+ .14	0.148	15.92	+ .14	0.161	15.38	+ .22	0.180	16.16	+ .12	0.168	16.01	+ .11
8	0.146	15.61	+ .14	0.169	16.06	+ .07	0.184	15.60	+ .26	0.206	16.28	+ .08	0.192	16.12	+ .09
9	0.164	15.75	+ .15	0.190	16.13	+ .08	0.207	15.86	+ .18	0.231	16.36	+ .08	0.216	16.21	+ .08
10	0.182	15.90	+ .12	0.211	16.21	+ .05	0.229	16.04	+ .18	0.257	16.44	+ .07	0.240	16.29	+ .08
11	0.200	16.02	+ .11	0.232	16.26	+ .03	0.252	16.22	+ .11	0.283	16.51	+ .03	0.264	16.37	+ .06
12	0.219	16.13	+ .07	0.253	16.29	+ .03	0.275	16.33	+ .10	0.308	16.54	+ .03	0.288	16.43	+ .06
13	0.237	16.20	+ .05	0.274	16.32	+ .02	0.298	16.43	+ .10	0.334	16.57	+ .03	0.313	16.49	+ .04
14	0.255	16.25	+ .04	0.295	16.34	+ .03	0.321	16.53	+ .06	0.360	16.60	+ .01	0.337	16.53	+ .04
15	0.273	16.29	+ .01	0.316	16.37	+ .01	0.344	16.59	+ .05	0.386	16.61	.00	0.361	16.57	+ .03
16	0.291	16.30	.00	0.338	16.38	+ .01	0.367	16.64	+ .03	0.411	16.61	.00	0.385	16.60	+ .02
17	0.310	16.30	− .01	0.359	16.39	+ .01	0.390	16.67	+ .03	0.437	16.61	− .01	0.409	16.62	+ .03
18	0.328	16.29	− .11	0.380	16.40	.00	0.413	16.70	.00	0.463	16.60	.00	0.433	16.65	+ .02
19	0.346	16.18	− .27	0.401	16.40	.00	0.436	16.70	− .01	0.488	16.60	− .02	0.457	16.67	.00
20	0.364	15.91	− .40	0.422	16.40	.00	0.459	16.69	− .17	0.514	16.58	− .08	0.481	16.67	.00
21	0.382	15.51	− .38	0.443	16.40	− .11	0.482	16.52	−1.24	0.540	16.50	− .21	0.505	16.67	− .02
22	0.401	15.13	− .14	0.464	16.29	−1.03	0.505	15.28	− .51	0.566	16.29	− .57	0.529	16.65	−1.45
23	0.419	14.99	− .10	0.485	15.26	− .36	0.528	14.77	− .07	0.591	15.72	− .53	0.553	15.20	− .55

The light curves given in the preceding table were derived from the same curves as the results given in the Table of Elements in Chapter III. The scale of these curves was not sufficiently great to enable the best results to be derived from them, when the changes were extremely rapid. Also, since they were drawn by hand through the observations, their exact form is liable to be affected by the personal equation of the draughtsman. The exact form of the light curve is important in any determination of the physical causes which underlie the phenomena of variability. In the following table, therefore, mean magnitudes are given, formed from the observations grouped according to phase, which are free from any personal equation. Moreover, although periods have been found for 110 variables in this cluster, the precise form of the light curve is doubtful, in the case of the more difficult objects, owing to the large accidental errors of measurement, and probably

in other cases, owing to the need of corrections for secular variation, or for other peculiarities. It seemed better, therefore, for the determination of the mean light curve of the variables in the cluster, to accept only those stars whose elements, as indicated by the remarks, already written, following the Table of Elements in Chapter III, were free from uncertainty. 54 variables were selected in this manner. These variables were first placed in 6 groups, each composed of 9 stars, arranged according to the length of the period. They are as follows: — Group 1, variables of shortest period, Nos. 72, 25, 22, 13, 74, 118, 96, 83, and 54, mean period $0^d.488$; Group 2, Nos. 76, 92, 53, 5, 44, 11, 16, 6, and 116, mean period $0^d.508$; Group 3, Nos. 52, 18, 21, 90, 1, 33, 82, 81, and 15, mean period $0^d.522$; Group 4, Nos. 55, 35, 45, 80, 9, 49, 40, 34, and 38, mean period $0^d.544$; Group 5, Nos. 63, 10, 104, 27, 31, 51, 39, 59, and 84, mean period $0^d.581$; Group 6, Nos. 114, 26, 117, 93, 64, 48, 14, 24, and 65, mean period $0^d.622$. Mean results were then obtained for each group. The observations of each star were divided into twenty-four groups according to phase, each group corresponding to one twenty-fourth part of the period. These equal parts are numbered from 0 to 23. The mean values of these different parts give 24 points for the mean light curves of the 6 groups of variables described above. These values are given in Table XVII. The first column gives the equal parts into which the periods were divided, and the second to the seventh columns, the corresponding mean values of the different groups of variables. The general means of the 54 stars comprising the groups are given in the eighth column. As explained on page 11, the time required to obtain photographs which would show the variables clearly when near minimum, with the 13-inch Boyden Telescope at Arequipa, was in general from 90^m to 120^m. Owing to the extraordinary rapidity of the light changes during the increase in brightness and near maximum, the form of the light curve is somewhat altered by the length of these exposures. A second mean light curve has therefore been found by uniting in the same manner as above, according to phase, the observations of the Keeler plates only, having exposures of 10^m, made on J. D. 2415160 and J. D. 2415161. These exposures are so brief that the form of the light curve derived from them alone is slightly, if at all, affected by the duration. To obtain more accurately the form of the curve, the period was divided in this case into 48 equal parts. The alternate points thus obtained, corresponding to the 24 points obtained for the values given in the second to the eighth columns of Table XVII, are given in the ninth column, and the intermediate points are given in the tenth column. Thus, for part 0, the mean value derived from the Keeler plates is 14.46, and for part 1, 14.63, the intermediate value being 14.59. Graphical representations of the results given in the eighth, ninth, and

tenth columns, with smooth curves drawn through them, are shown in Plate III, Figs. 5 and 6.

TABLE XVII

MEAN MAGNITUDES

Part	1	2	3	4	5	6	Mean, All	Mean, K Pl.	K Pl. Int.
0	14.69	14.47	14.77	14.80	14.88	14.87	14.73	14.46	14.59
1	14.69	14.60	14.92	14.89	14.87	15.00	14.85	14.63	14.71
2	14.86	14.81	14.92	15.12	15.13	15.00	14.96	14.91	15.00
3	14.95	15.12	15.17	15.15	15.42	15.45	15.21	15.20	15.38
4	15.32	15.23	15.34	15.43	15.72	15.41	15.40	15.52	15.60
5	15.63	15.60	15.52	15.62	15.78	15.58	15.62	15.67	15.96
6	15.98	15.90	15.99	15.97	16.22	16.05	16.02	15.91	16.10
7	16.16	16.00	16.16	16.18	16.37	16.20	16.19	16.18	16.25
8	16.35	16.24	16.27	16.28	16.42	16.29	16.30	16.28	16.36
9	16.44	16.39	16.45	16.54	16.45	16.44	16.45	16.45	16.48
10	16.48	16.45	16.57	16.52	16.50	16.50	16.50	16.55	16.56
11	16.53	16.58	16.69	16.61	16.55	16.55	16.59	16.61	16.56
12	16.56	16.57	16.70	16.66	16.58	16.57	16.61	16.62	16.67
13	16.66	16.71	16.75	16.69	16.63	16.61	16.67	16.72	16.71
14	16.74	16.76	16.73	16.66	16.63	16.67	16.70	16.72	16.70
15	16.64	16.72	16.71	16.70	16.64	16.57	16.67	16.73	16.68
16	16.57	16.74	16.72	16.71	16.65	16.60	16.66	16.73	16.73
17	16.71	16.70	16.67	16.74	16.74	16.58	16.70	16.71	16.69
18	16.69	16.65	16.68	16.72	16.67	16.68	16.69	16.71	16.69
19	16.70	16.64	16.69	16.73	16.60	16.50	16.64	16.65	16.70
20	16.69	16.71	16.65	16.70	16.60	16.45	16.64	16.67	16.70
21	16.73	16.60	16.47	16.42	16.14	16.09	16.43	16.65	16.45
22	15.72	16.03	15.63	15.91	15.72	15.61	15.79	16.00	15.19
23	14.71	15.04	14.97	15.15	15.02	15.21	15.00	14.86	14.59

Smooth curves were then drawn through the values given in Table XVII for the different groups. The results there given are so accordant that the largest deviation from these curves in the case of Group I is +.12, and the mean ±.03; for Group 2, +.11, and ±.03; for Group 3, −.09, and ±.03; for Group 4, +.08, and ±.02; for Group 5, +.12, and ±.04, and for Group 6, −.18, and ±.04. The elements given in Table XVIII have been derived from these smooth curves. The first column gives the number of the group, and the second column, the mean length of period of the 9 stars which compose it. The range in the length of period is small, the difference between the extreme groups being only $0^d.134$. The shortest individual period, which enters into the discussion, is $0^d.456$, and the longest, $0.^d668$.

The third column gives the mean distance from the centre of the cluster, and the fourth, fifth, and sixth columns, the mean maximum magnitude, the mean minimum magnitude, and the range. The seventh and eighth columns give the maximum rate of increase and of decrease of light, expressed in magnitudes, in one twenty-fourth part of the period. These results are shown graphically in Plate II, Fig. 4. An examination of them appears to indicate that the length of period is slightly, if at all, associated with the distance of the variable from the centre of the cluster, although such a relation might be partially masked, since the apparent central portion of the cluster contains not only the near stars but also those at various distances, which are in the line of sight. There appears to be, however, a fairly well marked relation between the period and the maximum magnitude, the minimum magnitude, and the range of variation. Especially well marked is the relation between the period and the rate of increase in light, and even in the rate of decrease, although in this case the differences are small. That the relation is not due to error in drawing these curves is shown by the sixth curve in Fig. 4, which gives the corresponding values derived from the Table of Elements, Chapter III, where the rates were derived from the individual curves, and are expressed in magnitudes per hour.

TABLE XVIII

54 VARIABLE STARS, GROUPED ACCORDING TO LENGTH OF PERIOD

Group	Mean Period	Mean Dist.	Mean Max.	Mean Min.	Range	Increase	Decrease
1	0.488	4.2	14.65	16.72	2.07	1.16	0.33
2	0.508	4.6	14.50	16.73	2.23	0.97	0.29
3	0.522	4.9	14.80	16.73	1.93	0.78	0.30
4	0.544	5.1	14.80	16.73	1.93	0.77	0.29
5	0.581	3.4	14.85	16.68	1.83	0.59	0.26
6	0.622	5.5	14.90	16.63	1.73	0.47	0.26

Smooth curves were also drawn through the mean results for the 54 selected variables, both for all the observations, and for the observations of the Keeler plates alone. The results obtained by reading these curves for each forty-eighth equal part are given in Table XIX. The first column contains the part, and the second column, the mean phase, corresponding to the mean period of the 54 variables, which is $0^d.544$. The third and fourth columns contain the corresponding magnitude and the difference between each magnitude and that next following it in the column, for all the observations. The fifth and sixth columns contain cor-

responding values for the curve derived from the Keeler plates of 10^m exposure alone. The seventh column gives the differences between the magnitudes thus obtained. The magnitude as derived from all the plates is subtracted from that obtained from the Keeler plates. Negative signs thus indicate that the magnitude derived from the Keeler plates is brighter than that derived from all the plates. These two light curves are shown graphically in Plate III, Figs. 5 and 6. They show clearly that the effect of the longer exposures is to reduce the brightness at maximum and to lessen the apparent rate of increase and decrease. Differences of a few hundredths of a magnitude in the two curves may perhaps be regarded as due to accidental errors, since the images of the stars are different on plates made by different instruments, but the systematically large negative residuals near maximum are undoubtedly caused by the duration of the exposures with the Bruce, and, especially, with the 13-inch Boyden Telescope. Indeed, the effect of this duration of the exposure is much greater than shown in this table, since the curve of all the observations includes also the observations on the Keeler plates. The real effect is nearly double that shown in the seventh column of the table, since nearly half of the plates were those of Keeler. The form of the light curve near minimum is about the same in the two curves, but elsewhere there are marked differences. The curve derived from the K plates alone probably represents the mean light curve of the variables in Messier 3 with considerable accuracy. There appears to be no duration of the maximum phase, the light beginning to fade rapidly as soon as the extremely rapid increase is concluded. As the minimum phase is approached, the rate of decrease becomes much slower. The entire decrease of the mean variable occupies about 54 per cent of the whole period, the minimum about 33 per cent, and the increase rather less than 13 per cent. Apparently the light remains almost, if not quite, uniform at minimum for three or four hours, although individual stars appear to present considerable differences in this regard. This is shown also in the results for the different groups on page 86. The light of Groups 1, 4, and 5 appears to decline very slowly until about the beginning of increase, while that of Groups 2, 3, and 6 seems to be more nearly uniform at minimum. These differences are small, however, and may be due to accidental errors. The mean maximum rate of the increase in light appears to be about 2.90 magn. an hour, and the decrease 0.60 magn. an hour. This mean rate of increase is greatly exceeded in many individual cases as is shown in the table of elements. An illustration of about an average rate of increase is given in Plate I, Fig. 2, which shows the rise from minimum to maximum and the beginning of the decrease in light of the star, No. 22, in the series of 16 K plates made on J. D. 2415161. The

series covers an interval of 3^h and 50^m, during which time the light of the variable rises from a measured magnitude of 16.77 to a maximum magnitude of 14.26, and then declines to the magnitude 15.80. The maximum rate of increase is about 2.8 magnitudes an hour. Variable No. 72 shows a much more rapid increase.

TABLE XIX

MEAN LIGHT CURVES

Part	Mean Phase	Magn. All	Δ	Magn. K Pl.	Δ	K—A	Part	Mean Phase	Magn. All	Δ	Magn. K Pl.	Δ	K—A
	d.							d.					
0	.000	14.73	+.04	14.49	+.07	−.24	24	.271	16.63	+.02	16.64	+.02	+.01
1	.001	14.77	+.05	14.56	+.09	−.21	25	.283	16.65	+.01	16.66	+.02	+.01
2	.023	14.82	+.07	14.65	+.11	−.17	26	.294	16.66	+.01	16.68	+.02	+.02
3	.034	14.89	+.08	14.76	+.12	−.13	27	.305	16.67	+.01	16.69	+.01	+.02
4	.045	14.97	+.11	14.88	+.14	−.09	28	.317	16.68	.00	16.70	.00	+.02
5	.057	15.08	+.10	15.02	+.16	−.06	29	.328	16.68	.00	16.70	+.01	+.02
6	.068	15.18	+.10	15.18	+.16	.00	30	.339	16.68	.00	16.71	+.01	+.03
7	.079	15.28	+.10	15.34	+.16	+.06	31	.350	16.68	.00	16.72	.00	+.04
8	.090	15.41	+.13	15.50	+.12	+.09	32	.362	16.68	.00	16.72	.00	+.04
9	.102	15.54	+.13	15.62	+.12	+.08	33	.373	16.68	.00	16.72	.00	+.04
10	.113	15.67	+.13	15.74	+.12	+.07	34	.384	16.68	.00	16.72	−.01	+.04
11	.124	15.83	+.16	15.86	+.11	+.03	35	.396	16.68	.00	16.71	.00	+.03
12	.136	15.98	+.10	15.97	+.11	−.01	36	.407	16.68	−.01	16.71	−.01	+.03
13	.147	16.08	+.10	16.08	+.09	.00	37	.418	16.67	−.01	16.70	.00	+.03
14	.158	16.18	+.09	16.17	+.08	−.01	38	.430	16.66	−.01	16.70	−.01	+.04
15	.170	16.27	+.09	16.25	+.07	−.02	39	.441	16.65	−.03	16.69	−.01	+.04
16	.181	16.32	+.05	16.32	+.05	.00	40	.452	16.62	−.09	16.68	−.01	+.06
17	.192	16.38	+.06	16.37	+.06	−.01	41	.464	16.53	−.12	16.67	−.03	+.14
18	.204	16.44	+.06	16.43	+.05	−.01	42	.475	16.41	−.26	16.64	−.23	+.23
19	.215	16.49	+.05	16.48	+.04	−.01	43	.486	16.15	−.40	16.41	−.41	+.26
20	.226	16.53	+.04	16.52	+.04	−.01	44	.497	15.75	−.49	16.00	−.77	+.25
21	.237	16.56	+.02	16.56	+.03	.00	45	.509	15.26	−.26	15.23	−.40	−.03
22	.249	16.58	+.02	16.59	+.03	+.01	46	.520	15.00	−.18	14.83	−.25	−.17
23	.260	16.61	+.03	16.62	+.02	+.01	47	.531	14.82	−.09	14.58	−.09	−.24

This star is so distant from the centre of the cluster that the stars are somewhat scattering, and only one adjacent star is found sufficiently near to appear in the reproductions given in Plate I, Fig 3. Five plates are shown, covering an interval of 61 minutes, during which time the variable rises from minimum, magnitude 16.94, to maximum, magnitude 14.26. The details for this star can be seen on page 27. The most rapid change is between the time of the second and third figures when the increase is 1.26 magn. in 11 minutes, or at the rate of 6.56 magn.

an hour. The maximum rate as derived from a tangent to the smooth curve drawn through the observations is 6.38 magn. an hour.

The scale of magnitudes of the sequence of comparison stars, as explained in Chapter I, was made to conform to that of the Polar Sequence. The mean maximum magnitude of the variables in Messier 3, as derived from the mean observations on the Keeler plates, is 14.49, the mean minimum magnitude, 16.72, and the range, 2.23 magnitudes. These values probably represent the truth more closely than means derived from the table of elements depending upon all the observations. The corresponding values of the variables of Class a in ω Centauri, were 12.99, 14.11, and 1.12, respectively. The stars in Messier 3 are much fainter than those in ω Centauri, since in general the exposure required to obtain images of the variables in the former cluster was about three times as great as in the latter. This does not altogether account for the large differences in magnitude and range between the variables in the clusters, however, and it is probable that a difference of scale also exists in the sequences of the comparison stars employed. The scale of magnitudes of the sequences used for ω Centauri, as explained in H.A. **38**, Chapter I, was determined by the use of photographic scales, on which triple the exposure was assumed to represent an interval of one magnitude. The North Polar Sequence, which has given an apparently secure basis for the magnitudes of the sequence stars in Messier 3, had not been determined at that time. The scale of magnitudes in ω Centauri therefore will need revision. Light is thrown on this subject by a comparison of the value of the grade in the two cases, although in practice the value of the grade is not the same for different individuals, nor constant for the same individual. The value of one grade for the stars of ω Centauri, as given in H.A. **38**, page 205, was 0.08 magn. for Miss Leland, and 0.11 magn. for the writer. The corresponding values for Messier 3 are 0.10 magn., derived from 1200 comparisons, and 0.13 magn., derived from 848 comparisons. In a paper read before the Ottawa meeting of the Astronomical and Astrophysical Society in 1911, published in Science, Vol. 34, page 532, a means of correcting any error in the scale of magnitudes employed was proposed. By a determination of the number and magnitudes of the individual stars, and the integration of the results, the magnitude of the cluster as a whole can be obtained. For the central portion of the cluster, which cannot be studied in detail, the number and magnitudes of the stars would need to be determined according to the laws of their distribution. The magnitude of such a condensed cluster as Messier 3, regarded as a single star, can be obtained directly with considerable accuracy. A comparison of the two magnitudes of the cluster, thus independently derived, would give a correction to the scale of magnitudes employed for the individual stars, if such was needed.

The mean deviation from the smooth curve for the observations of each variable was given in Table XV. The general mean for all the stars there given, whose periods were determined, is 0.173 magn. This is larger than that found for the variables in ω Centauri, and may be due in part to a more open scale of magnitudes in the case of Messier 3. It may be due in part, also, to the fact that Messier 3 is a much fainter and more condensed object than ω Centauri. These deviations are caused not merely by the accidental errors of measurement, but also in many cases apparently by the lack of a second term to correct the results for secular variation. The residuals are obtained in all cases from the use of a simple period. That these variations would be materially reduced in some cases by the use of a second term in the period of the star is shown on page 57 for variable No. 94. Also, large deviations may sometimes be caused by small errors in the adopted periods. That these deviations are somewhat affected by the difficulty of measuring objects near the centre of the cluster is shown by the fact that the mean deviation of all the stars within 2'.0 of the centre is 0.20 magn. This is, however, only one of the difficulties which tend to reduce the accuracy of the measures. In Messier 3 only one sequence of comparison stars was employed, and in many cases in order to make a comparison it was necessary for the eye to pass across the central stellar mass and seek the image of a star more or less confused with others. Though this is by no means so difficult photographically as visually, it is nevertheless impossible under such circumstances to attain the highest precision. Also, on some of the plates the form of the images differs considerably on different sides of the cluster, which renders precise comparisons difficult. Under such circumstances greater precision would no doubt be obtained, if a special sequence could be selected and measured for each variable, or for each group of adjacent variables. It is hoped that this may be done later for a selected number of the variables, but the great labor of employing this method for all the variables has prevented its adoption in the present treatise. Although such elaborate methods would doubtless give more accordant results, it seems improbable that the elements of the variables would thereby be materially changed. The elements have been determined from observations between J. D. 2413372 and J. D. 2415161. It is hoped that this discussion may soon be extended to include occasional observations down to the present time.

652 remeasurements, or attempts at remeasurement, are given in Table XI. These were made when the deviation from the smooth curve amounted to 0.40 magn., or more. For reasons given above, occasional deviations of from two to four tenths of a magnitude must be expected from the accidental errors of meas-

urement. In 541 cases, the value obtained by the remeasurement agreed with the original measure within 0.40 magn. In 16 cases, no remeasurement was made since the object was considered too difficult for comparison. In 94 cases, the value obtained by remeasurement differed by 0.40 magn., or more, from the early determination and a third examination appeared to show that the second comparison was more nearly correct. In one case, the early comparison appeared better. In many of the above cases the comparison was difficult. Persistently large deviations are probably due to errors in the period, the need of a correction for secular variation, and to defects on the photographic plates, aggravated by the difficulties of measurement referred to above.

All the variables in Messier 3 are probably of Class IV, Sub-class a, according to the classification given in H.A. 38, page 132. They are sometimes referred to as "Cluster Variables." The term "Antalgols," which has been applied to them appears to be inaccurate. In some cases, where the measures have been very difficult, or other cause of uncertainty is present, the form of the light curve is somewhat doubtful, but they appear even in such cases to belong to the same class. Doubtless close adjacent stars, either constant or variable, whose light is inseparable from that of the variable, tend to obscure the real form of the light curve in some cases. Of the 110 stars, whose periods have been determined, 2 have a period of about $0^d.41$, none of $0^d.42$ or $0^d.43$, 1 each of $0^d.44$ and $0^d.45$, 2 of $0^d.46$, none of $0^d.47$, 4 each of $0^d.48$ and $0^d.49$, 11 each of $0^d.50$ and $0^d.51$, 12 of $0^d.52$, 8 each of $0^d.53$, $0^d.54$, and $0^d.55$, 4 of $0^d.56$, 5 each of $0^d.57$ and $0^d.58$, 3 of $0^d.59$, 6 of $0^d.60$, 4 of $0^d.61$, 2 each of $0^d.62$ and $0^d.63$, 1 of $0^d.64$, 2 of $0^d.65$, 1 each of $0^d.66$ and $0^d.67$, none of $0^d.68$ or $0^d.69$, and 1 each of $0^d.70$ and $0^d.71$. These results are shown graphically in Plate II, Fig. 3. The mean period of the 110 variables is $0^d.54124$, or $12^h\ 59^m\ 23^s.1$. Aside from the central mass of the cluster, where the images of even the brighter stars coalesce, a number of rather close doubles occur among the relatively bright stars. When one of these is variable the approximate position and brightness of the companion has been given in the remarks following the Table of Elements.

Ten faint nebulae, apparently spirals with stellar nuclei, appear on the plate referred to on page 1, made by Ritchey with the 60-inch Reflector on Mount Wilson, having an exposure of four hours. Whether these nebulae are really members of the cluster, or merely projected upon it, is not apparent.

X 9205, taken on J. D. 2414456.502, was an isochromatic plate. If the variables in this cluster were red, and the plate sufficiently sensitive to color, any differences between the variables and the comparison stars might be shown by an excess of

negative residuals. The mean residual of all the measures of the variables on this plate is −0.02 magn. The smallness of this quantity appears to indicate either that the variables are not red compared with the comparison stars, or that the plate, with which no colored screen was used, was not sufficiently sensitive to determine the quantity.

The distribution of the variables is shown in Table XX, where they are grouped according to their distances from the centre of the cluster. The central portion of Messier 3, on photographs having sufficient exposure to show the variables at minimum, is so condensed that the stars cannot be accurately counted or examined for variability. The extent of this central burnt-out portion varies with the size and quality of the instrument, the length of the exposure, the sensitiveness of the plate, and the condition of the atmosphere. The first column in the table gives the mean distances of the various groups from the centre of the cluster, expressed in minutes and tenths of arc. These quantities are derived from the fourth column of Table XV. The first group, therefore, contains all the variables whose distances from the centre lie between 0′.0 and 0′.9, the second group those between 1′.0 and 1′.9, etc. The most distant variable belongs to the group marked 17′.5. The second column gives the number of variables found in each group. The third column contains the areas expressed in square minutes corresponding to the different groups. The fourth column contains the number of variables per square minute in each group. It is found by dividing the quantity given in the second column by the corresponding quantity in the third column. The quantities in the first and fourth columns were then plotted, using distances from the centre as abscissas and the number of variables per square minute as ordinates. As in the case of the variables in ω Centauri, discussed in H.A. **38**, a logarithmic curve of the form, $y = a^{(b-x)}$ appears to correspond fairly well with the results. For the variables in Messier 3, the value of a is 1.78, and of b, 11.5, on the assumption that the number of variables at the distance 11.5 is one for every one hundred square minutes of area, and that for each successive group the number increases in the ratio 1.78. The fifth column gives the ordinates of this curve, which thus represents the number of variables per square minute at different distances according to the above law. The sixth column contains the residuals found by subtracting the values given in the fifth column from those in the fourth column. Negative quantities, therefore, indicate that the number of variables actually found is less than the number to be expected from the assumed law of distribution. The agreement between the number of variables found and the number indicated by the above formula is reasonably good, except in the case of the first group, where there

is a very large negative residual. This, however, was to be expected, since as stated above, a detailed examination of the central mass of the cluster was impossible. This residual may serve to indicate in a general way how many variables remain undiscovered. The number of variables present in this region according to the assumed law of distribution would be 5.64 per square minute, or 17 in all. Since 5 have already been found in this area, 12 would thus remain for discovery.

TABLE XX

DISTRIBUTION OF THE VARIABLES

Distance	Variables					All Stars		Per ct. var.
	No.	Area	Prop.	Curve	O—C	Prop.	O—C	
′								
0.5	5	3.1	1.61	5.64	−4.03	89.1	+49.4	2
1.5	32	9.4	3.40	3.17	+0.23	38.0	+15.8	9
2.5	32	15.7	2.04	1.78	+0.26	13.4	+ 0.5	15
3.5	15	22.0	0.68	0.99	−0.31	4.5	− 2.4	15
4.5	13	28.3	0.46	0.56	−0.10	2.3	− 1.6	20
5.5	10	34.6	0.29	0.31	−0.02	1.7	− 0.5	17
6.5	8	40.8	0.20	0.18	+0.02	1.0	− 0.3	20
7.5	9	47.1	0.19	0.10	+0.09	0.7	0.0	27
8.5	5	53.4	0.09	0.06	+0.03	0.4	0.0	22
9.5	1	59.7	0.02	0.03	−0.01	0.5	+ 0.3	4
10.5	2	66.0	0.03	0.02	+0.01	0.2	+ 0.1	15
11.5	1	72.3	0.01	0.01	0.00	0.1	0.0	10
12.5	2	78.5	0.03	..	..	..	..	..
13.5	1	84.8	0.01	..	..	..	..	..
14.5	0	91.1	0.00	..	..	..	..	..
15.5	0	97.4	0.00	..	..	..	..	..
16.5	0	103.7	0.00	..	..	..	..	..
17.5	1	110.0	0.01	..	..	..	..	..

A telescope of great focal length would be desirable for the study of these remaining variables. The seventh and eighth columns relate to the distribution of all the stars in the cluster. A careful count of the stars in this cluster was made in 1895 at Arequipa on a glass enlargement of X 6792, taken with the 13-inch Boyden Refractor, and having an exposure of 100 minutes. A reticle divided into 2500 squares was placed over the enlargement, and the number of stars in each square counted, with the exception of the central four squares, where the number of stars was estimated. The whole area counted formed a square, the length of one side of which was 18′ 40″. The details of this count will be published

elsewhere. For the present purpose, the results have been arranged as described in H.A. **26**, page 216, so that the stars in squares equally distant from the centre of the cluster are grouped together. These small groups were then combined into larger groups whose mean distances are the same as those of the groups of variables given in the first column of the table. The whole number of stars per square minute is given in the seventh column for each group, and the corresponding residuals from the smooth curve referred to above are given in the eighth column. These results are shown graphically in Plate II, Fig. 6. The number of variables is represented by black circles connected by straight lines, and the number of all the stars, by crosses. The smooth curve represents the assumed law. In plotting the quantities given in the seventh column, the vertical scale was divided by seven. The accordance of these results is fairly good, except as the centre is approached, where the rate of increase in the number of stars is much greater than that of the variables. This, again, is to be expected from the increasing difficulty of finding the variables near the centre of the cluster. An examination of Fig. 6 shows that while an arithmetical progression satisfies the results especially well for a portion of the distance, a geometrical progression appears to satisfy the results fairly well over a much larger extent. It should be noted, however, that these counts represent the apparent distribution of the stars as projected on a plane tangent to the celestial sphere, and do not give the actual distribution in space. The results of both counts may be slightly modified by stars not members of the cluster, but which are projected upon it. This effect, however, must be small. The counts show a systematic decrease in the number of stars and variables to a distance of perhaps 12′. Beyond that, the numbers are too small to permit much value to be attached to the results for the individual groups. That outlying members of the cluster exist at much greater distances, however, is indicated by the variable, No. 123, having the typical light curve of cluster variables, at a distance of 17′. The last column in the table gives the percentage of variables, which have been found, among all the stars in the various groups. As has been shown above, the percentage of variables found near the centre of the cluster is necessarily small. The number of variables in the more distant groups is also too small to permit of precise values in particular cases. As stated in H.A. **38**, page 2, of the stars examined for variability in Messier 3, about one in seven, or fourteen per cent, was found to be variable. The mean value of the results given in the last column of the table is fifteen per cent.

The known variable stars in this cluster are all of about the same brightness. Of the 110 variables whose periods and light curves have been determined, not

one is as bright as the fourteenth magnitude at maximum, and all are between the sixteenth and seventeenth magnitudes at minimum. There are few stars in the cluster which are brighter than the fourteenth magnitude, only one or two of which appear to be variable. No variables have yet been found among the great number of very faint stars in the cluster from the sixteenth to the twenty-first magnitude. An examination of several thousand of these stars was made on four Keeler photographs, as explained in H.A. 38, page 3. No variables were found, but the results were not conclusive, owing to the small number of plates and especially, to the extreme faintness of the stellar images. Sufficiently long exposures with the great reflectors, like the 60-inch on Mount Wilson, would probably show 50,000 stars. The central portion of the cluster would be burnt out on such photographs, but many thousands of very faint stars somewhat distant from the centre could be conveniently examined. It would be of great interest to know whether as great a percentage of these stars are variable, as of the brighter stars of the cluster. If variables exist only among the brighter stars, this fact would have an important bearing on the theory of their evolution.

The duration of the photographic exposure is of the greatest importance in a study of light variations. When the images are too faint the results are doubtful, and when the exposure is too long the variations are obscured. Plates that would serve best for a study of the extremely faint stars would be of little value for the determination of the light changes of the known variables.

No satisfactory theory has yet been advanced to account for the physical causes which underlie the peculiar light curves of cluster variables. That they are binary systems seems probable. The discovery of isolated variables of this class sufficiently bright to permit precise spectroscopic studies would perhaps lead to the correct solution. Otherwise, it may be necessary to wait until instruments of sufficient power are available to obtain such observations for the variables now known in the globular clusters.

In addition to the important assistance rendered by Miss E. F. Leland, who made the measurements of 69 of the variables, the writer wishes to acknowledge the valuable help given by Miss I. E. Woods and Professor E. S. Manson, Jr., in the reduction of the results or in their preparation for the printer, and, especially, to Professor E. C. Pickering, Director of the Observatory, for assistance and advice throughout the work.

DESCRIPTION OF THE PLATES

PLATE I. FRONTISPIECE. FIGURE 1. The cluster, Messier 3. This chart is reproduced from H.A 38, Plate VIII, Figure 1. The scale is 10″ = 0.1 cm. The original negative, X 8611, was taken on June 1, 1897, with the 13-inch Boyden Telescope. The exposure was 121^{m}. Variables 82, 112, 113, 114, 115, and 123 are too distant from the centre of the cluster to appear in this reproduction.

FIGURE 2. Variable No. 22. Example of variability. Of the three stars shown in each photograph, the variable is the upper, left-hand star. The scale of the enlargements is about 1″= 0.1 cm. They were made from a series of 16 Crossley plates obtained by Keeler on May 21, 1900. Each plate had an exposure of 10 minutes, and the Greenwich Mean Time of the middle of the exposure is placed above each photograph. The corresponding measured magnitudes are 16.77, 16.67, 16.36, 15.97, 15.48, 14.77 14.36, 14.26, 14.36, 14.50, 14.64, 14.71, 15.00, 15.21, 15.47, and 15.80, respectively. Since the definition and intensity of the images change on different plates, on account of various instrumental and atmospheric effects, it is necessary to compare the brightness of the variable only with the other stars on the same photograph. No. 22 represents light changes of about average rapidity in the cluster Messier 3. See page 19.

FIGURE 3. Variable No. 72. Example of rapid increase in light. The variable is the lower left-hand star. The scale is the same as in Figure 2. The five plates here shown belong to the same series as those given in Figure 2. The mean times of the exposure are placed above the enlargements and the corresponding magnitudes are 16.94, 16.70, 15.44, 14.41, and 14.26. The maximum rate of increase in light of this star appears to be more than six magnitudes an hour.

PLATE II. FIGURE 1. Secular correction to phase for variable No. 94. For a description of this curve, see page 55.

FIGURE 2. Secular correction to phase for variable No. 79. See page 58.

FIGURE 3. The periods of the variables. See page 92.

FIGURE 4. Curves showing the relation of the distance from the centre, maximum magn., minimum magn., range, rate of increase, and decrease of light, to the length of the period. See page 87.

FIGURE 5. Curve showing the extremely rapid rate of increase in light of variable 72, from a series of plates made with the Crossley Reflector on the night of May 21, 1900. This curve represents in magnitudes the changes shown in Plate I, Figure 3. See page 89.

FIGURE 6. Distribution of the variables, and all the stars, of the cluster. For a description of this curve, see page 93.

PLATE III. FIGURE 1. Light curve of the variable No. 94, with the assumption of a uniform period, $0^{d}.52370$. See page 56.

FIGURE 2. Light curve of the variable No. 94 with a correction to the simple period, $+0^d.03 \sin (0°.1924+272°.3)$. See page 57.

FIGURE 3. Light curve of No. 79, with the assumption of a uniform period, $0^d.48388$. See page 58.

FIGURE 4. Light curve of No. 79, assuming a change of period at J. D. 4118 from $0^d.48285$ to $0^d.48329$. See page 59.

FIGURE 5. Mean light curve of 54 selected variables in Messier 3, measured on all the plates. See page 88.

FIGURE 6. Mean light curve of 54 selected variables in Messier 3, measured on the Keeler plates of 10 minutes exposure. See page 88.

END OF VOLUME 78, PART I

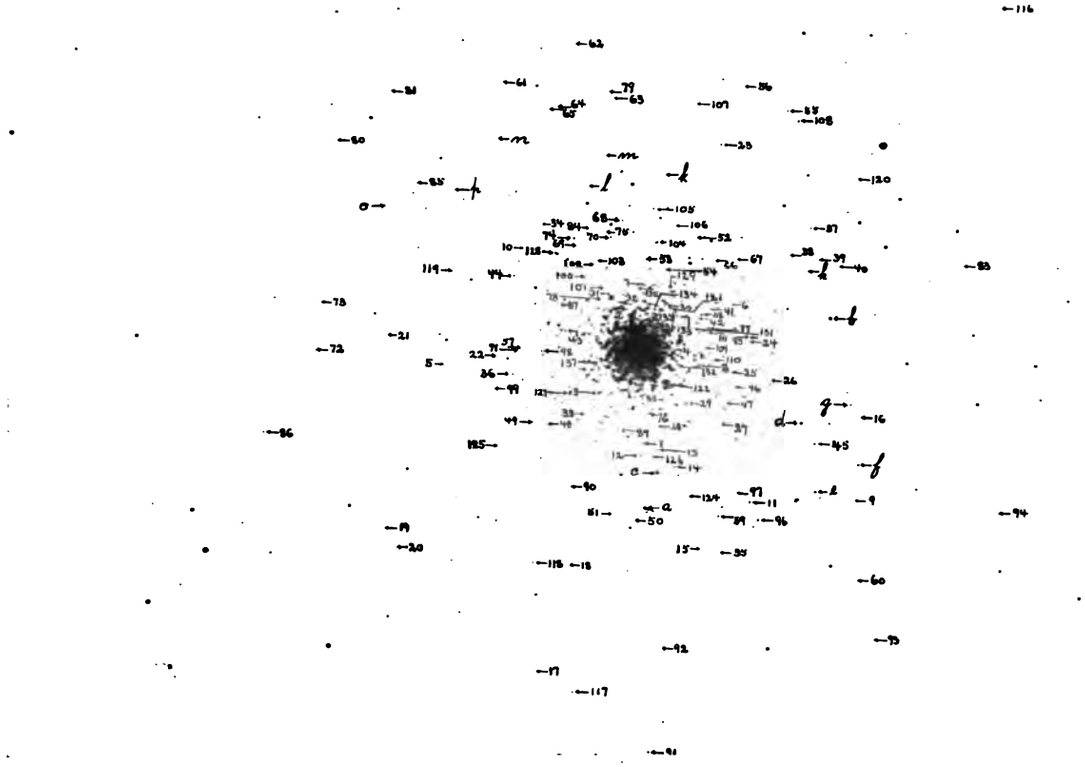


FIG. 1. THE CLUSTER MESSIER 3

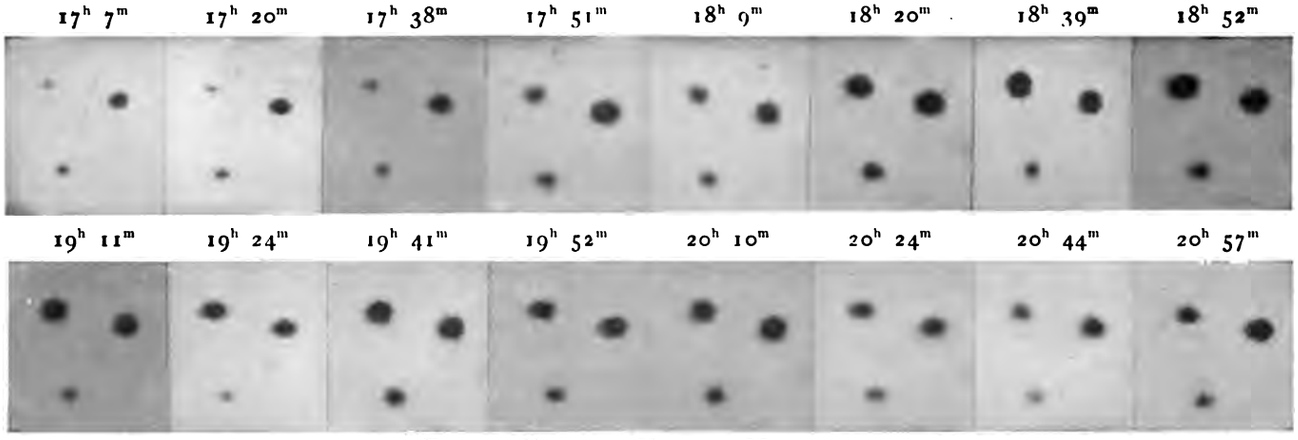


FIG. 2. VARIABLE NO. 22. MAY 21, 1900.

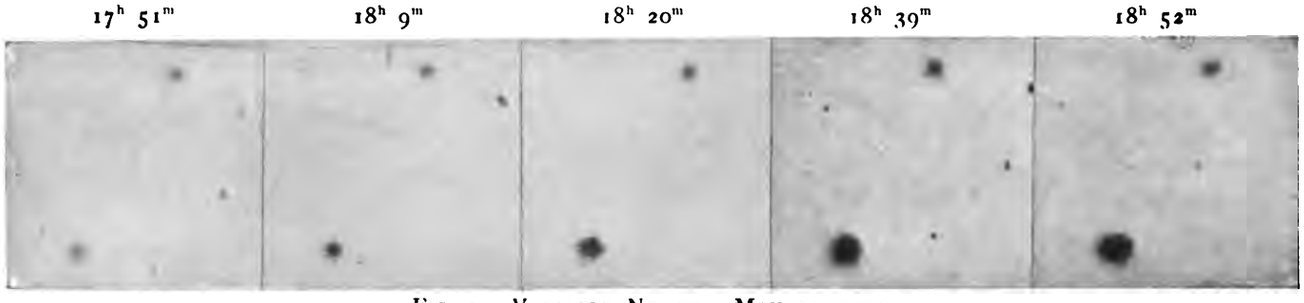


FIG. 3. VARIABLE NO. 72. MAY 21, 1900

MESSIER 3. CLUSTER. EXAMPLES OF VARIABILITY

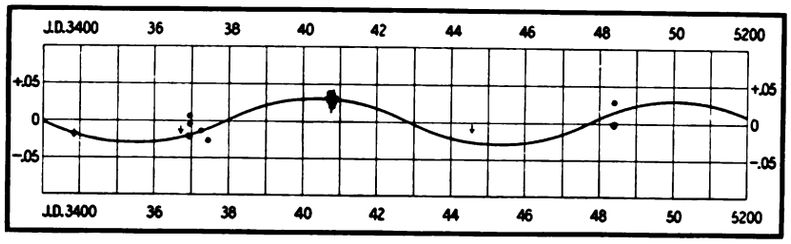


FIG. 1. NO. 94. SECULAR VARIATION

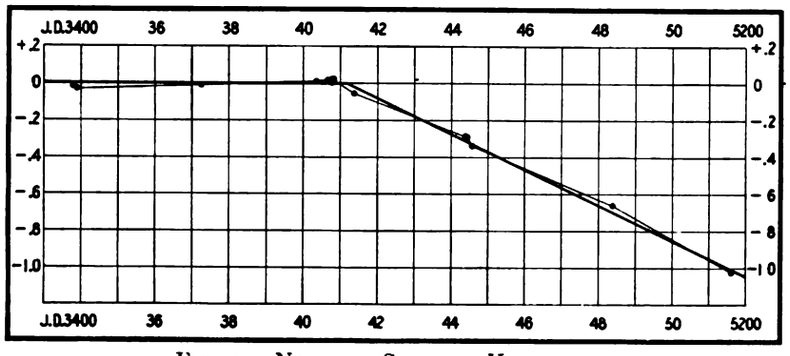


FIG. 2. NO. 79. SECULAR VARIATION

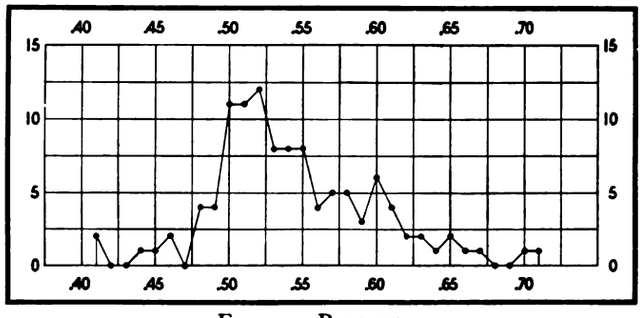


FIG. 3. PERIODS

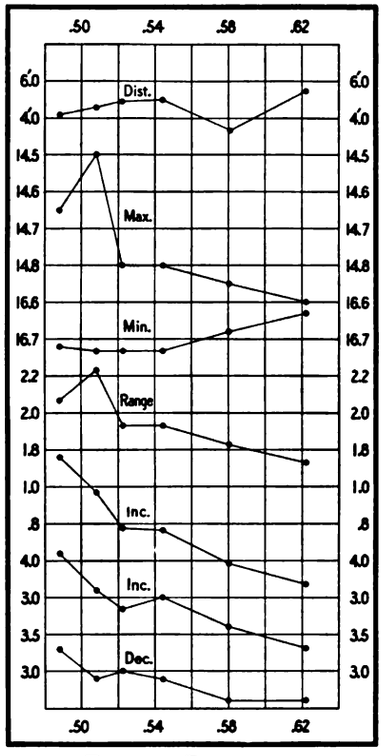


FIG. 4. RELATIONS

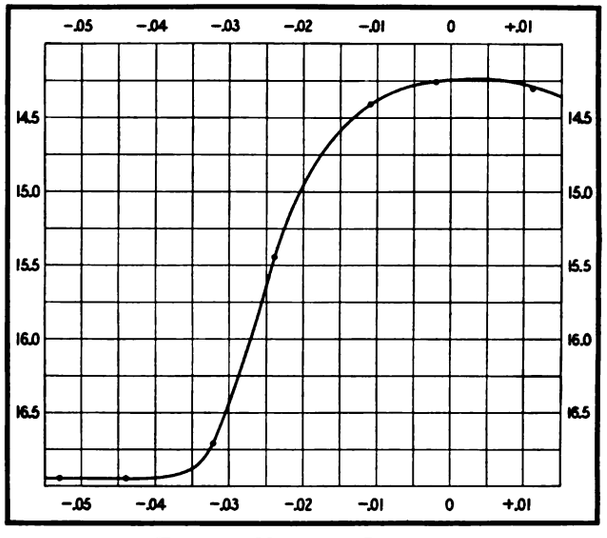


FIG. 5. NO. 72. INCREASE

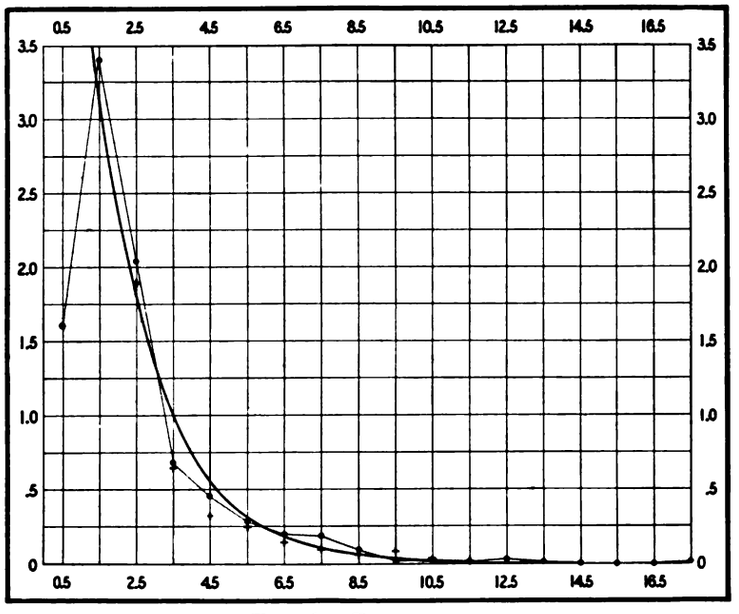


FIG. 6. DISTRIBUTION

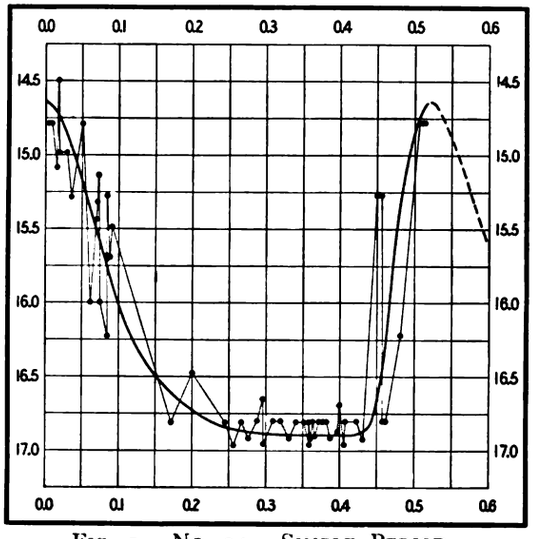


FIG. 1. NO. 94. SIMPLE PERIOD

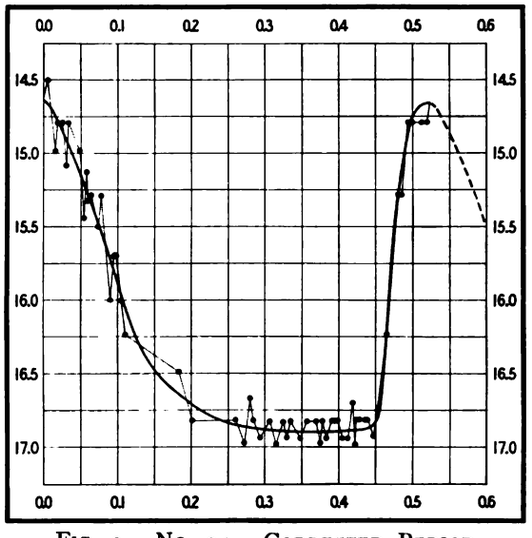


FIG. 2. NO. 94. CORRECTED PERIOD

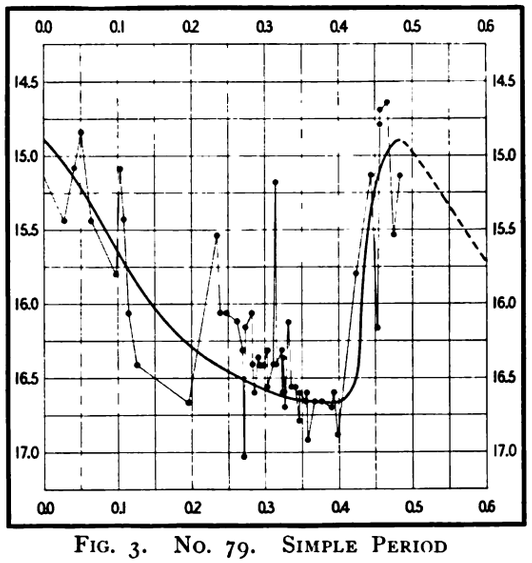


FIG. 3. NO. 79. SIMPLE PERIOD

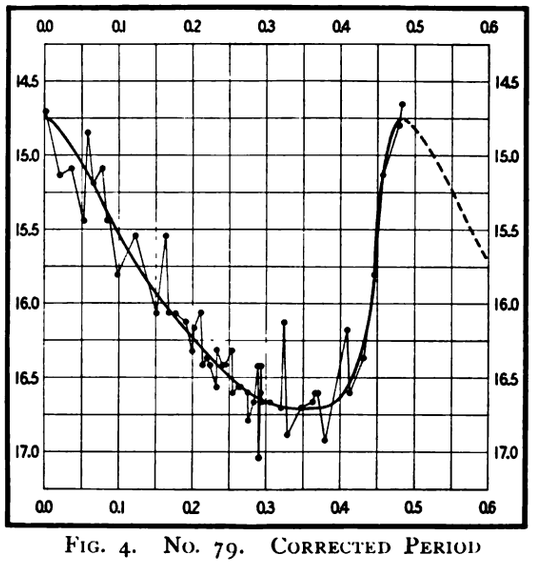


FIG. 4. NO. 79. CORRECTED PERIOD

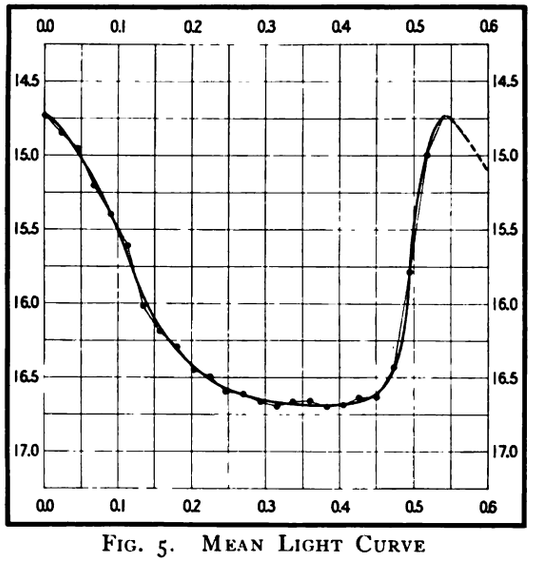


FIG. 5. MEAN LIGHT CURVE

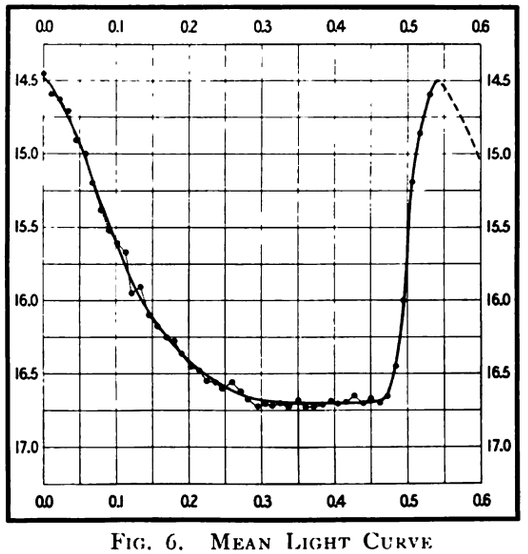


FIG. 6. MEAN LIGHT CURVE

MESSIER 3. LIGHT CURVES OF VARIABLES

ANNALS

OF

THE ASTRONOMICAL OBSERVATORY OF HARVARD COLLEGE

EDWARD C. PICKERING, DIRECTOR

VOLUME 78, PART 2

VARIABLE STARS

IN THE

CLUSTER MESSIER 5

BY

SOLON I. BAILEY

PHILLIPS PROFESSOR OF ASTRONOMY

PRINTED FROM FUNDS RESULTING FROM THE WILL OF

JOSIAH QUINCY, JUN.

WHO DIED IN APRIL, 1775, LEAVING A NAME INSEPARABLY CONNECTED WITH THE HISTORY OF THE AMERICAN REVOLUTION

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VARIABLE STARS IN THE CLUSTER MESSIER 5

CHAPTER V

SEQUENCE OF COMPARISON STARS

MESSIER 5, N.G.C. 5904, was one of the first globular clusters systematically examined at Arequipa for the discovery of variable stars. As announced in H. C. 2, 46 variables were found in this cluster in 1895. This number was later increased to 92, but the variability of 8 of them, Nos. 22, 23, 25, 46, 48, 49, 51, and 53, is somewhat doubtful. The variable stars in this cluster were also among the first to be measured, but, due to the pressure of other work and the lack of absolute photographic magnitudes, the discussion and publication of the results have been postponed for nearly twenty years.

The history of this cluster is interesting. It was discovered by Kirch, according to the diary of his wife, in 1702. Although it was included in his lists by Messier, its true nature was probably first clearly recognized by Herschel. In 1890, Mr. D. E. Packer discovered visually a variable star near this cluster. English Mechanic **51**, 378. This variable is doubtless No. 42 of the present Harvard list. Later, Mr. Packer announced a second variable, which may be identical with No. 84, as suggested by Professor Barnard. From an examination of the chart given by Mr. Packer, in English Mechanic **52**, 81, however, it seems probable that his second variable is the triple star whose faintest component is Variable No. 37. It is possible that one of the brighter components also varies, but this is not well shown on the Harvard plates. Sid. Mess. **10**, 107. A. N. **147**, 243. The variability of both these stars was confirmed by Mrs. Fleming on Harvard photographs. A. N. **125**, 157. Also, in 1890, Mr. A. A. Common announced that 5 stars shown on his photographs near Messier 5 were probably variable. They do not appear to be identical with any of the Harvard variables, and, so far as known to the writer, no further investigations regarding them were ever made. The positions of 62 of the variables found at Arequipa and of various standard and comparison stars were determined in 1897 by Professor Pickering and Mrs. Fleming. H.A. **26**, 226. Later determinations of

positions were made by Miss A. Winlock in 1901. H.A. **38**, 239. A careful study of the period and light curve of No. 33, from visual observations with the 40-inch Yerkes Telescope, was made by Professor E. E. Barnard in 1909. A.N. **184**, 273. See also A. N. **196**, 11. A study of the distribution of the stars in globular clusters, with special reference to Messier 5, was made in 1914, by Professor Elis Strömgren and Dr. Bj. Drachmann. Publ. Köbenhavns Observatorium, No. 16. In 1911, Dr. E. A. Fath obtained on Mount Wilson a photograph of the spectrum of the centre of this cluster, giving an exposure of $16^h\ 17^m$. He states: — "The following absorption lines are present: F, Hγ, G, H, K, and a band at 419 $\mu\mu$, which may possibly be double. The appearance is practically that of a solar spectrum, except that Hγ is more pronounced here than in the sun." A.P.J. **37**, 198. There is evidence, however, that the stars of this cluster do not all belong to the same spectral type.

The approximate position of Messier 5 for 1900 is $15^h\ 13^m.5$, $+2°\ 27'$. Its appearance is that of a hazy star of about the fifth magnitude. It is extremely condensed at the centre. The diameter of the cluster has not been determined from counts of the stars, but is probably about the same as that of Messier 3, $25'$, or greater. Two variable stars Nos. 68 and 69, are distant from the centre, respectively, $15'.0$ and $16'.6$. These variables are of the cluster type, and are doubtless real, though outlying, members of the cluster. No. 67 is at a distance of $17'.1$ from the centre, but its range of variation appears to be small, and its period and light curve have not been determined. The variables were all found by the examination of plates made with the 13-inch Boyden Telescope. The focal length of this instrument is 191.5 inches, and the scale of the photographs is, therefore, 0.1 cm. equals $42''.4$. The exposures were in general about one hour, and somewhat more than a thousand stars are shown on the plates. Near the centre, however, the images are too densely crowded for individual examination, so that the number of stars actually compared on different plates for variability was only 900. Of these about ten per cent were found to be variable. When photographed with a powerful reflector, Messier 5, like Messier 3 and several other globular clusters, is shown to contain many thousands of faint stars, an examination of which might lead to interesting results. Von Zeipel has reached the conclusion that such clusters form gigantic systems containing about a million stars. Kungl. Svenska Vetenskapsakademiens Handlingar **51**, No. 5, 51. The brightest star within the limits of Messier 5 is the comparison star a, of the eleventh magnitude, but H. P. 5694, magnitude 5.18, lies just beyond the border of the cluster at $15^h\ 14^m.2$, $+2°\ 9'$, or about $22'$ from the centre. The photographic magnitudes of the comparison stars have been determined by Miss Leavitt, whose discussion of the subject is given below.

The scale of magnitudes depends on comparisons with stars of the North Polar Sequence, on plates having duplicate exposures or taken in series, as described in H.A. 71, 235. The magnitudes of stars in the North Polar Sequence, as given in H.A. 71, 231, were used for the reduction, omitting all stars whose designations are followed by the letters r, or s. A list of the plates employed for this comparison is given in Table XXI. The numbers in the first column are preceded by the letters A, MC, or H, designating the 24-inch Bruce Telescope, 16-inch Metcalf Telescope, and 24-inch Reflector, respectively. The current number of the series in which the plate was taken is given in the second column. The two A plates have duplicate exposures, on Messier 5 and on Harvard Standard Region C9 at R. A. = $17^h\,00^m$, Dec. = $+15°.0$, respectively. The magnitudes of the stars in the sequence for C9 used for reduction, were obtained by comparison with the North Polar Sequence.

TABLE XXI

PLATES USED FOR COMPARISON WITH POLE

Plate	Series	Year	J.D.	Exp.	±Δ	±Σ	Plate	Series	Year	J.D.	Exp.	±Δ	±Σ
				m.							m.		
A 7832	..	06	7404	30	*01*	11	MC 8450	486	15	0608	10	03	11
A 8363	..	07	7758	30	01	11	H 768	..	13	9952	10	*02*	08
MC 3138	70	13	9865	10	06	13	H 830	1	14	0281	12	*03*	10
MC 5380	244	14	0240	10	*13*	15	H 832	1	14	0281	12	06	10
MC 5421	247	14	0246	10	08	11	H 840	2	14	0285	12	06	12
MC 8398	482	15	0600	10	07	12	H 842	2	14	0285	12	*03*	13

The third, fourth and fifth columns give the year, omitting the two left-hand figures, in which the plate was taken, the Julian Day, and the length of the exposure expressed in minutes. The sixth and seventh columns contain the algebraic and arithmetical means of the residuals, the former representing the error of the zero point, and the latter, the average deviation of a single measure. The systematic errors are large on some of the plates and if these were eliminated, the remaining accidental errors would average about ±0.07 magn. All of the plates given in Table XXI were measured by Miss M. E. O'Reilly. Measures on Plates H 768, H 830, and H 832 were also made by Miss E. F. Leland. Plates MC 8398 and MC 8450 were taken in series after final magnitudes were adopted, but are included in order to compare them with the other plates. The deviations for these two plates, as given in the last two columns, are taken from the adopted magnitudes, and the accordance is shown to be good.

In addition to the measures on plates given in Table XXI, estimates in grades between each star and the one next fainter were made on ten plates taken with the 13-inch Boyden Telescope, on each of the five H plates given in Table XXI, on two plates taken with the 60-inch Mount Wilson Reflector, and on two plates taken with the 26-inch McCormick Telescope. The plates taken with the last two instruments were kindly loaned by the Directors of the Mount Wilson and McCormick Observatories. Estimates were made by Professor Bailey, Miss Leland, Miss Leavitt, and Miss O'Reilly, and reduced graphically to the scale determined by means of the plates in Table XXI. The magnitudes thus determined were arranged in four groups, each containing four or five plates, according to the instrument, and the observer. Means were taken for the plates in each group, and then the mean of the resulting magnitudes was found. The average deviation of an observation on a single plate from the mean of four or five contained in a group is $\pm$0.060 magn., and that of a single group from the mean of four is $\pm$0.035 magn. The McCormick plates are isochromatic, taken with a yellow screen, and give photovisual magnitudes. At present we have not the material for reducing them to an absolute scale, but they are of value for their indication of the colors of the stars.

In Table XXII, the designation of the comparison star is contained in the first column and is, in general, the same as in H.A. **38**, 239. Greek letters are given to stars which were measured with the 12-inch photometer. Stars d^1, d^2, e^1, e^2, f^1 and h^1 were added to the original sequence in order to obtain a greater amount of material for determining the scale. The remaining stars belong to the original sequence, and were alone used in observing the variables. The second and third columns contain the coordinates in x and y from the centre of the cluster, expressed in seconds of arc. The coordinates for the original sequence are taken from H.A. **38**, 239. Their positions are shown also on Plate VIII, Fig. 2, of that volume. The positions of the additional stars d^1, d^2, e^1, e^2, f^1 and h^1 were measured by Miss Leland on the enlargements employed for the original measures. The stars designated by Greek letters are too far from the cluster to be covered by the enlargements, and their positions were measured on an original negative by Miss A. D. Walker.

The fourth and fifth columns give the photometric magnitude, taken from H.A. **74**, 154, and the photographic magnitude as derived from the plates in Table XXI, omitting MC 8398 and MC 8450, which were taken too late to be used. Plate H 753, taken in series, was also measured but is of poor quality, and was rejected for extreme discordance. The residuals in the sixth column refer to five groups, each composed of several plates, as follows: — 3 MC plates, first measures, original

sequence only; 3 MC plates, later measures, including additional stars; 5 H plates, first measures; 5 H plates, later measures with additional stars; 2 A plates. The plates taken with the Bruce Telescope are thus given smaller weight than those taken with the other instruments, but this is not objectionable as they are much poorer in quality, as well as less numerous. The adopted photographic magnitude is given

TABLE XXII

MESSIER 5. COMPARISON STARS

Des.	x	y	Ptm.	Prelim. Ptg.	Residuals	Ptg.	Res. Est.	Res. Omitted	Color Index
a	+ 580.	−346.	10.74	11.05	*21*, 06, *04*, 18, 38	11.06	01	13	−0.21
b	− 423.8	−114.5	..	11.61	*11*, *11*, 19, 01, 00	11.61	00	06	+0.09
β	+ 724.	−211.	11.37	11.85	*22*, *11*, .., 12, 22	11.85	..	04	..
γ	−1273.	− 88.	11.38	11.90	*06*, 07, .., *19*, 19	11.90	..	15	..
δ	+ 525.	−570.	11.52	12.47	*02*, *12*, .., 17, *04*	12.47	..	01	..
c	− 585.	+ 72.	..	12.61	*06*, *01*, 09, *02*, 00	12.58	*03*	*02*	+0.21
d	− 36.2	+519.5	..	13.20	*19*, 03, 13, *03*, 05	13.18	*03*	27	−0.04
d^2	+ 453.2	+183.2	..	13.34	.., *18*, .., 19, ..	13.42	08	19	+1.20
e	− 64.9	+216.8	..	13.49	*38*, *36*, 35, 44, *05*	13.52	04	04	+1.25
ε	+ 305.	−386.	12.92	13.63	*11*, *21*, .., 27, 06	13.63	..	06	..
d^1	− 227.2	+443.6	..	13.84	.., *01*, .., 00, ..	13.78	*06*	03	−0.19
ζ	+ 147.	−494.	13.12	13.84	*15*, 00, .., 22, *06*	13.84	..	*08*	..
e^2	− 226.2	+353.0	..	13.97	.., *16*, .., 16, ..	14.01	04	05	+0.79
e^1	− 362.4	+107.8	..	14.07	.., *10*, .., 10, ..	14.02	*04*	04	+0.90
f	− 30.6	+194.1	..	14.03	*14*, *09*, 19, 17, *12*	14.04	00	*03*	+0.42
f^1	+ 26.3	+280.4	..	14.29	.., *13*, .., 13, ..	14.25	*04*	05	+0.58
g	− 64.1	+179.4	..	14.37	*25*, *25*, 22, 48, *20*	14.40	04	13	+0.13
h	− 65.0	+146.4	..	14.82	02, *14*, 17, 32, *36*	14.82	00	*06*	+0.10
h^1	− 54.6	+166.2	..	..	.., .., .., .., ..	14.94	..	..	−0.28
l	− 113.4	+106.3	..	15.06	.., *02*, 14, 06, *18*	15.06	01	*12*	−0.16 ?
m	− 146.1	+136.8	..	15.25	.., 05, 13, 01, *18*	15.26	01	..	..
n	− 82.3	+101.1	..	15.56	.., .., 13, .., *12*	15.58	02	..	+0.36
o	− 77.0	+ 91.9	..	16.05	.., .., A, .., ..	15.98	*06*	..	+0.86 ?
p	− 95.3	+ 85.6	..	16.30	.., .., A, .., ..	16.32	02	..	..
q	− 97.5	+ 68.9	..	..	.., .., .., .., ..	16.90	..	..	..

in the seventh column, and is the mean of the magnitude in the fifth column and that derived from estimates, as described above. The residual from the estimated magnitude is given in the eighth column. The ninth column gives the residual from the mean of Plates MC 8398 and MC 8450 which are shown to be in such good accordance that their inclusion would have made no material difference in the final result. The last column gives the residual found by subtracting the photovisual

magnitude derived from the two McCormick plates, from the adopted photographic magnitude. The color indices thus obtained are subject to considerable error, but indicate the relative colors of the stars approximately. Star e, for example, is seen to be very red, while star a is white. The unusually large residuals for star e, as given in the sixth column, are probably due to its color.

CHAPTER VI

OBSERVATIONS OF THE VARIABLES IN MESSIER 5

THE first measures of the variables in Messier 5 were made by Miss Leland in 1896, soon after their discovery. The original plan was to confine the discussion to 100 plates which were available in 1901. The work was delayed for several years, however, and in order to bring the discussion down to a later date, 23 additional plates, taken between the years 1902 and 1912, were afterwards added. All the measurements are given in Table XXIII. They were made on plates taken with the following instruments:—X series, made with the Boyden 13-inch Telescope, including the plates made by Professor E. S. King on Mount Wilson, California, in 1889, and those made at Arequipa, Peru, during the years 1895 to 1908; C Series, one plate, made with the 11-inch Draper Telescope at Cambridge: A Series, made with the 24-inch Bruce Telescope at Arequipa; MW Series, so called in this publication, made on Mount Wilson, in 1912, with the 60-inch Reflector through the kindness of the Director of the Solar Observatory, Professor G. E. Hale. It is thus seen, that by a somewhat remarkable coincidence, the first and last plates of this table were made on Mount Wilson, the first in 1889, and the last, after an interval of 23 years, in 1912. The exposure needed to show the variables to the best advantage at minimum is from 40 to 60 minutes, for the 13-inch and 11-inch Refractors, 20 to 30 minutes for the 24-inch Reflector, and probably about 6 minutes for the 60-inch Reflector. The exposure actually given with the 60-inch Reflector, with a single exception, was 10 minutes. These plates are of admirable quality, but this exposure proved to be too long for the known variables, which are among the brighter stars of the cluster, and rendered their measurement for brightness rather difficult. The more distant variables cannot be measured on these plates, owing to the small field of good definition of a reflecting telescope. These plates, however, will provide much valuable material for stars in the cluster somewhat fainter than the variables. In addition to the above series of plates, photographs of the cluster have been recently obtained by Professor King with a 24-inch Reflector at Cambridge. None of these have yet been used for the study of the variables, but they will serve for future extension of the discussion. The observations given in the table extend over more than twenty years, in many cases, and include from 10,000 to 20,000 returns of maximum. All the exposures were made on ordinary commercial dry plates, with

the exception of MW 84, 85, and 105 to 112, which were made on isochromatic plates, but without any screen.

In general, the variables were compared by Argelander's method with a brighter and a fainter star of the sequence given on page 107. The estimates were made in grades which were later reduced to magnitudes, as described on page 12. To save space only the resulting magnitudes are given in Table XXIII. The first two and a half pages of the table contain data in regard to the plates, followed by the results derived for three of the variables. The first column contains the letter used to designate the series and the number of the plate. The second column gives the year, month, and day, on which the plate was made, and the third column, the corresponding Julian day and decimal of the middle of the exposure. These dates have been corrected for the equation of light. The fourth column gives the duration of the exposure in minutes, and the fifth column, the quality of the plate on a scale of 5, in which 1 indicates that it is practically worthless, 2 very poor, 3 fair, 4 good, and 5 excellent. The given quality is the mean of two estimates, one by Miss Leland, and one by the writer. For each variable, as in Part I of this volume, only three columns are employed, the first containing the magnitude, the second, the phase of the observation, or the time elapsed since the last computed maximum, and the third, the deviation of this magnitude from the smooth curve drawn through all the observations. This curve is based on the elements given in Chapter VII. The observations were plotted and the curves drawn, for the results given in this table, on the assumption that the periods are uniform. A positive residual implies that the measured magnitude is fainter, and a negative residual that it is brighter than that indicated by the curve. Dots in the second and third columns show that no period has been determined. When the residual is 0.6 magn., or greater, the variable has been remeasured and the result will be found in Table XXIV. When the second measure differs by 0.5 magn., or more, from the original measure, a third examination was made independently. If the original measure was found to be wrong, the corresponding residual in Table XXIII has been replaced by the letter R, and the corrected result can be found in Table XXIV. The letter R has also been used in place of the residual when the second measure shows that an accurate determination of the magnitude appears impossible. This is indicated in the seventh column of Table XXIV by the letter D. When a magnitude is expressed in Italics, it indicates that the variable was fainter than the value given. A few especially doubtful magnitudes have been expressed only to tenths. After the first two and a half pages, only the Julian date is given, followed by the results for the variables.

TABLE XXIII

OBSERVATIONS OF THE VARIABLES

Plate	Date			J. D.	Ex.	Qual.	No. 1. Per. 0d.521790			No. 2. Per. 0d.526344			No. 3. Per. 0d.600184		
							Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
	y.	m.	d.												
X 1444	1889	5	22	1145.794	57	2	14.46	0.022	06	....	....	..	....	....	..
X 1482	"	"	25	1148.796	62	2.5	*15.0*	0.415	..	....	....	..	....	....	..
X 1530	"	6	1	1155.796	64	2	14.82	0.110	*20*	....	....	..	14.61	0.006	*06*
X 1586	"	"	7	1161.809	60	2	15.78	0.384	21	....	....	..	14.66	0.017	*01*
X 1690	"	"	20	1174.794	69	2.5	*14.9*	0.324	..	....	....	..	....	....	..
X 1728	"	"	24	1178.785	50	2.5	15.16	0.141	*02*	14.94	0.025	34	....	....	..
X 1941	"	7	15	1199.701	44	2.5	15.21	0.185	*15*	14.22	0.414	*98*	14.89	0.098	03
X 6637	1895	6	1	3346.540	60	3	15.47	0.380	*10*	15.37	0.295	*13*	14.66	0.078	*14*
X 6763	"	"	21	3366.544	100	5	14.27	0.034	*20*	15.42	0.298	*08*	15.47	0.276	10
X 6784	"	"	24	3369.698	60	3.5	14.94	0.057	28	....	....	..	....	....	..
X 6785	"	"	25	3370.528	85	4.5	15.47	0.366	*10*	14.66	0.072	*17*	14.94	0.059	20
X 6786	"	"	26	3371.529	75	4.5	15.47	0.323	*11*	14.27	0.020	*32*	15.47	0.460	*08*
X 6805	"	"	29	3374.502	75	4.5	15.16	0.165	*12*	15.37	0.361	*10*	15.47	0.432	*07*
X 6806	"	"	29	" .538	20	4	15.16	0.201	*24*	15.37	0.397	07	15.47	0.468	*08*
X 6813	"	7	1	3376.502	40	4.5	14.66	0.078	*14*	15.42	0.256	*05*	14.78	0.031	10
X 6814	"	"	1	" .543	40	4.5	14.89	0.119	*15*	15.47	0.297	*03*	14.78	0.072	01
X 6815	"	"	1	" .584	40	3.5	15.42	0.160	15	15.42	0.338	*08*	15.02	0.113	10
X 6817	"	"	1	" .677	66	3	15.42	0.253	*12*	15.47	0.431	47	15.16	0.206	*05*
X 6821	"	"	2	3377.578	40	4	14.94	0.111	*08*	15.47	0.279	*02*	15.47	0.507	*07*
X 6829	"	"	3	3378.579	45	3.5	14.89	0.068	16	15.37	0.227	*04*	15.42	0.308	*01*
X 6836	"	"	5	3380.500	50	4.5	15.47	0.424	*03*	14.56	0.043	*12*	15.47	0.428	*07*
X 6838	"	"	5	" .602	50	3.5	14.22	0.004	*01*	15.42	0.145	24	15.37	0.530	*10*
X 6877	"	"	15	3390.604	60	4	14.66	0.092	*22*	15.21	0.147	02	15.37	0.329	*08*
X 6956	"	8	2	3408.568	90	3.5	15.42	0.315	*16*	14.99	0.215	*40*	15.37	0.287	*03*
X 6958	"	"	3	3409.544	46	4.5	15.37	0.247	*16*	14.94	0.138	*20*	14.66	0.063	*09*
X 6960	"	"	3	" .623	60	3.5	15.42	0.326	*16*	15.47	0.217	07	15.37	0.142	35
X 6974	"	"	5	3411.603	42	3.5	15.37	0.219	*10*	14.89	0.092	*04*	15.73	0.322	27
X 6981	"	"	6	3412.560	45	4	14.94	0.133	*22*	14.22	0.522	*35*	14.66	0.078	*14*
X 6991	"	"	7	3413.569	50	4.5	14.89	0.098	*03*	14.89	0.478	21	15.83	0.487	28
X 7000	"	"	8	3414.620	50	3	14.99	0.106	01	14.61	0.477	*08*	15.73	0.338	26
X 7007	"	"	9	3415.489	40	3.5	15.42	0.453	09	15.47	0.293	*03*	14.80	0.006	13
X 7008	"	"	9	" .531	40	4	14.89	0.495	39	15.47	0.335	*03*	14.82	0.048	09
X 7009	"	"	9	" .572	40	4.5	14.27	0.014	*05*	15.47	0.376	10	15.02	0.089	19
X 7010	"	"	9	" .614	40	3.5	14.61	0.056	*02*	15.37	0.418	20	15.11	0.131	15
X 7018	"	"	13	3419.548	45	3.5	15.42	0.337	*16*	15.16	0.142	*01*	15.73	0.464	18
X 7036	"	"	16	3422.494	45	3.5	15.42	0.153	18	15.37	0.456	56	16.10	0.409	57
X 7038	"	"	16	" .591	54	3	15.42	0.250	*11*	14.56	0.027	*05*	15.47	0.506	*06*
X 7043	"	"	17	3423.506	75	4.5	14.89	0.121	*18*	15.37	0.415	20	15.11	0.221	*16*
A 1756	"	"	"	3666.649	30	3	14.99	0.110	*01*	15.16	0.387	*18*	15.73	0.289	33
X 7469	1896	4	23	3673.681	65	3	15.47	0.359	*10*	14.66	0.050	*04*	14.73	0.119	*20*
X 7499	"	5	13	3693.638	60	3.5	14.66	0.488	06	14.56	0.006	*02*	15.21	0.270	*16*
A 1781	"	"	"	3694.577	23	2.5	15.11	0.383	*46*	16.15	0.419	R	14.76	0.009	09
A 1782	"	"	14	" .615	30	3.5	15.30	0.421	*23*	14.94	0.457	14	14.79	0.047	06
A 1784	"	"	15	3695.519	42	3	15.16	0.281	*41*	15.11	0.308	*39*	15.42	0.350	*07*
A 1785	"	"	15	" .561	36	4	15.21	0.323	*37*	15.30	0.350	*19*	15.47	0.392	*05*
A 1786	"	"	15	" .602	30	3	15.37	0.364	*20*	15.61	0.391	28	15.57	0.433	04
A 1787	"	"	15	" .644	30	3	15.73	0.406	18	15.83	0.433	85	15.73	0.475	18
A 1788	"	"	18	3698.504	41	2.5	14.94	0.136	*19*	15.11	0.135	*03*	15.37	0.335	*10*
A 1789	"	"	19	3699.499	36	3	14.89	0.087	05	14.89	0.078	03	15.05	0.129	08
A 1790	"	"	19	" .542	30	3	14.89	0.130	*23*	14.94	0.121	*14*	14.94	0.172	*17*

Plate	Date			J. D.	Ex.	Qual.	No. 1. Per. 0d.521790			No. 2. Per. 0d.526344			No. 3. Per. 0d.600184		
							Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
	y.	m.	d.												
A 1791	1896	5	19	3699.584	30	4	15.21	0.172	11	15.21	0.163	06	15.08	0.214	16
A 1809	"	6	2	3713.513	60	3	14.39	0.013	07	15.42	0.407	18	15.30	0.339	17
A 1812	"	"	2	" .680	45	2.5	15.11	0.180	23	15.08	0.047	41	15.73	0.506	19
A 1825	"	"	6	3717.517	52	3	15.21	0.364	36	15.37	0.200	00	14.99	0.142	03
A 1828	"	"	6	" .692	45	3	14.39	0.018	04	15.30	0.375	09	15.37	0.317	08
A 1829	"	"	"	" .817	44	2	14.76	0.143	44	14.61	0.500	01	15.42	0.442	12
X 7601	"	"	13	3724.535	60	3.5	14.79	0.077	01	15.42	0.375	05	15.05	0.558	01
X 7603	"	"	13	" .676	60	3.5	15.47	0.218	00	14.61	0.516	02	14.94	0.098	06
X 7661	"	7	7	3748.572	60	3.5	14.99	0.112	04	16.4	0.201	..	14.79	0.587	06
X 7789	"	8	3	3775.556	45	4	14.79	0.485	10	15.78	0.341	28	15.21	0.563	21
X 8358	1897	2	4	3960.869	60	3	14.66	0.040	14	16.3	0.381	..	....	....	..
C 10149	"	3	30	4014.745	84	3	15.37	0.172	04	14.89	0.044	22	15.30	0.279	08
X 8452	"	4	22	4037.635	35	3	14.99	0.103	00	15.47	0.301	03	....	....	..
X 8453	"	"	22	" .663	37	3.5	15.16	0.131	02	15.6	0.329	..	....	....	..
X 8467	"	"	26	4041.675	60	4	14.51	0.491	03	15.16	0.130	04	....	....	..
X 8515	"	5	7	4052.600	70	4	15.05	0.458	32	14.61	0.002	04	15.37	0.322	08
X 8538	"	"	13	4058.548	60	3.5	15.45	0.145	25	15.26	0.160	00	15.21	0.268	16
X 8540	"	"	13	" .662	57	4	15.60	0.259	07	15.37	0.274	12	15.26	0.382	25
X 8542	"	"	13	" .780	50	4	15.66	0.377	09	15.26	0.392	07	15.26	0.500	28
X 8544	"	"	13	" .854	50	3	15.28	0.451	06	14.82	0.466	09	14.89	0.574	02
X 8556	"	"	21	4066.635	50	4	15.66	0.405	11	15.26	0.352	22	15.06	0.553	11
X 8564	"	"	22	4067.636	54	4	15.66	0.362	08	15.37	0.300	13	15.37	0.353	11
X 8571	"	"	24	4069.560	57	4	15.37	0.199	04	15.21	0.119	14	15.37	0.477	18
X 8576	"	"	24	" .795	53	3	15.68	0.434	20	15.37	0.354	10	14.82	0.112	10
X 8578	"	"	25	4070.655	60	4	15.61	0.250	08	15.26	0.161	01	15.26	0.371	24
X 8583	"	"	26	4071.538	60	4.5	14.92	0.090	04	14.61	0.517	02	14.61	0.054	13
X 8586	"	"	26	" .747	58	4.5	15.61	0.299	04	15.58	0.200	21	15.37	0.263	01
X 8591	"	"	27	4072.538	60	2.5	14.72	0.046	18	14.89	0.465	15	15.58	0.454	03
X 8594	"	"	27	" .745	60	4	15.42	0.253	12	15.26	0.146	08	14.61	0.061	13
X 8596	"	"	28	4073.553	60	4	14.46	0.018	12	15.37	0.427	30	15.37	0.269	00
X 8599	"	"	28	" .758	60	4	15.58	0.223	08	15.06	0.106	06	15.37	0.474	18
X 8604	"	"	29	4074.561	54	4.5	14.38	0.504	04	15.58	0.383	20	14.71	0.076	08
X 8657	"	6	9	4085.663	60	4	15.11	0.127	01	15.37	0.431	39	15.26	0.375	24
X 8662	"	"	10	4086.608	60	2.5	14.71	0.028	29	15.47	0.324	03	14.82	0.120	11
X 8702	"	"	16	4092.573	50	4	15.58	0.253	04	14.07	0.499	55	14.82	0.083	00
X 8706	"	"	17	4093.532	47	4	15.26	0.169	03	15.47	0.405	23	15.37	0.442	17
X 8710	"	"	17	" .762	55	2.5	15.76	0.399	20	14.99	0.109	04	14.61	0.071	17
X 8754	"	7	27	4133.607	60	3	14.66	0.066	06	14.66	0.478	02	15.42	0.304	01
X 8790	"	8	10	4147.519	90	4	15.37	0.411	18	14.89	0.179	42	15.16	0.412	37
X 9159	1898	5	27	4437.629	60	3.5	15.78	0.406	23	15.27	0.273	22	14.66	0.033	01
X 9501	1899	5	20	4795.632	60	3.5	15.27	0.461	04	15.37	0.362	08	15.37	0.326	09
X 9790	"	7	10	4846.568	55	3.5	15.42	0.262	13	15.47	0.243	02	15.37	0.247	04
X 9859	"	"	24	4860.582	50	3	15.42	0.187	07	14.71	0.046	03	15.73	0.456	18
X 9916	"	8	9	4876.513	52	3	15.37	0.465	32	15.37	0.186	04	15.32	0.182	18
X 9940	"	"	19	4886.535	73	3	14.66	0.051	06	15.16	0.208	24	14.89	0.001	21
X 10249	1901	6	24	5560.608	62	3.5	14.56	0.493	05	14.71	0.034	09	14.71	0.068	04
X 10253	"	"	26	5562.605	60	3.5	15.73	0.403	18	15.11	0.452	28	15.37	0.264	00
X 10254	"	"	27	5563.594	60	3	15.42	0.348	16	15.37	0.388	00	14.66	0.053	07
X 10256	"	7	13	5579.551	60	4	15.04	0.130	09	14.76	0.029	15	15.37	0.405	15
X 10257	"	"	15	5581.558	60	3	14.66	0.050	08	14.94	0.456	14	14.61	0.011	07

Plate	Date			J. D.	Ex.	Qual.	No. 1. Per. 0d.521790			No. 2. Per. 0d.526344			No. 3. Per. 0d.600184		
							Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
	y.	m.	d.												
X 10452	1902	5	29	5899.564	62	5	15.73	0.286	16	14.89	0.025	30	15.47	0.520	*04*
X 10458	"	"	31	5901.555	60	4	15.04	0.189	*36*	15.04	0.437	09	14.99	0.110	09
X 10460	"	"	31	" .646	60	3	15.73	0.280	16	14.99	0.001	42	14.99	0.201	*21*
X 10804	1904	6	1	6633.655	60	3	15.47	0.218	00	15.23	0.392	*08*	14.66	0.586	*10*
X 10805	"	"	2	6634.509	55	4	14.51	0.028	07	15.73	0.193	39	15.16	0.239	*14*
X 10806	"	"	2	" .566	54	4	14.76	0.085	*11*	15.61	0.250	15	15.27	0.296	*15*
X 10808	"	"	2	" .682	50	4	15.47	0.201	05	15.37	0.366	*06*	15.37	0.412	*16*
X 10967	1905	6	24	7021.639	60	3	14.32	0.512	02	14.71	0.460	*07*	15.37	0.251	03
X 10973	"	"	26	7023.629	60	4	15.73	0.415	20	15.73	0.345	24	15.37	0.440	*17*
X 10974	"	"	26	" .678	60	3	14.71	0.464	*39*	15.37	0.394	05	15.73	0.489	19
X 12123	1908	8	3	8157.558	60	4	14.32	0.494	*13*	14.99	0.003	41	14.66	0.021	*02*
MW 82	1912	5	10	9533.816	10	4	15.52	0.270	*03*	14.66	0.398	*64*	14.66	0.058	*08*
MW 84	"	"	10	" .888	10	5	15.73	0.342	15	14.66	0.469	*05*	14.99	0.130	02
MW 85	"	"	10	" .914	10	4	15.57	0.368	*01*	....	....	..	15.16	0.156	12
MW 86	"	"	10	" .947	25	5	15.73	0.401	18	14.71	0.002	13	15.37	0.189	23
MW 105	"	"	14	9537.761	10	5	14.71	0.041	18	15.47	0.132	35	15.61	0.401	08
MW 106	"	"	14	" .786	10	5	14.89	0.066	18	15.47	0.157	24	15.37	0.426	*16*
MW 107	"	"	14	" .812	10	5	14.99	0.092	09	15.73	0.183	41	15.47	0.452	*07*
MW 108	"	"	14	" .836	10	5	15.32	0.116	29	15.47	0.207	09	15.47	0.476	*08*
MW 109	"	"	14	" .874	10	4	15.37	0.154	13	15.61	0.245	15	15.73	0.514	21
MW 110	"	"	14	" .899	10	4	15.52	0.179	19	15.47	0.270	*02*	15.47	0.539	06
MW 111	"	"	14	" .924	10	4	15.73	0.204	30	15.52	0.295	02	14.89	0.564	*04*
MW 112	"	"	14	" .950	10	3	15.47	0.230	*03*	15.47	0.321	*03*	14.76	0.590	04

J. D.	No. 4. Per. 0d.449632			No. 5. Per. 0d.545903			No. 6. Per. 0d.54883			No. 7. Per. 0d.494383			No. 8. Per. 0d.546222		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
1145.794	....	....	..	14.27	0.514	*16*	13.83	0.044	*62*	....	....	..	14.56	0.034	05
1148.796	14.56	0.347	*97*	....	....	..	14.66	0.302	*47*	....	....	..	14.94	0.305	*63*
1155.796	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
1161.809	15.11	0.321	*42*	....	....	..	15.11	0.143	28	14.56	0.473	18	14.94	0.209	*41*
1174.794	....	....	..	14.56	0.035	22	14.17	0.505	*33*	14.66	0.110	*32*	....	....	..
1178.785	....	....	..	14.17	0.205	*114*	14.66	0.105	*06*	....	....	..	....	....	..
1199.701	14.99	0.443	61	14.89	0.377	*70*	14.66	0.166	*22*	....	....	..	....	....	..
3346.540	15.73	0.290	21	14.89	0.179	*33*	14.22	0.531	*01*	14.61	0.032	18	14.66	0.052	00
3366.544	14.56	0.060	*01*	14.56	0.531	25	14.94	0.228	*07*	15.73	0.260	01	15.73	0.392	13
3369.698	14.89	0.067	27	14.89	0.409	*70*	14.56	0.089	*08*	14.66	0.448	*44*	....	....	..
3370.528	14.27	0.447	01	14.89	0.147	*21*	14.99	0.370	*19*	15.83	0.289	06	14.32	0.006	02
3371.529	14.66	0.099	*16*	14.61	0.057	14	14.89	0.273	*20*	15.73	0.301	*04*	15.73	0.461	16
3374.502	15.73	0.374	21	15.47	0.300	*06*	14.56	0.502	*04*	15.47	0.308	*30*	15.11	0.156	*05*
" .538	14.94	0.410	*45*	15.37	0.336	*20*	14.27	0.538	05	15.73	0.344	*06*	15.57	0.192	27
3376.502	15.37	0.126	36	15.11	0.116	23	15.37	0.307	24	15.83	0.331	04	14.56	0.518	*31*
" .543	15.37	0.167	13	15.42	0.157	29	15.11	0.348	*06*	15.42	0.372	*36*	14.32	0.012	*01*
" .584	15.73	0.208	34	15.42	0.198	14	15.37	0.389	18	15.47	0.413	*26*	14.89	0.053	25
" .677	15.16	0.301	*37*	*15.7*	0.291	..	15.42	0.482	32	14.22	0.011	*07*	15.21	0.146	09
3377.578	15.73	0.303	20	14.94	0.101	15	15.11	0.285	00	15.73	0.418	03	14.99	0.501	*19*
3378.579	15.21	0.405	*22*	14.27	0.010	*03*	14.94	0.189	01	15.78	0.430	11	15.37	0.410	*23*
3380.500	14.94	0.078	30	15.73	0.293	20	14.99	0.463	*16*	15.73	0.373	*05*	15.04	0.146	*09*
" .602	15.47	0.180	17	15.42	0.395	*18*	14.61	0.016	31	14.27	0.475	*10*	15.47	0.248	00
3390.604	15.11	0.290	*42*	14.22	0.025	*10*	14.66	0.139	*14*	14.94	0.095	07	15.73	0.418	13

J. D.	No. 4. Per. $0^d.449632$			No. 5. Per. $0^d.545903$			No. 6. Per. $0^d.54883$			No. 7. Per. $0^d.494383$			No. 8. Per. $0^d.546222$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
3408.568	15.73	0.268	24	15.37	0.520	97	14.66	0.541	46	15.73	0.262	00	15.73	0.356	13
3409.544	15.78	0.345	25	15.73	0.404	13	15.37	0.419	17	15.47	0.249	*23*	15.37	0.240	*07*
" .623	14.99	0.424	*11*	15.73	0.483	58	14.89	0.498	09	15.47	0.328	*31*	15.42	0.319	*16*
3411.603	15.37	0.156	17	15.47	0.280	*03*	15.37	0.283	27	15.83	0.330	05	14.89	0.114	*12*
3412.560	15.73	0.214	32	15.37	0.145	29	14.89	0.142	06	15.78	0.299	01	1.422	0.525	*43*
3413.569	15.83	0.323	30	14.66	0.062	14	14.66	0.053	16	15.73	0.319	*05*	15.73	0.441	14
3414.620	14.61	0.026	33	14.66	0.021	35	14.66	0.007	43	15.83	0.381	06	15.73	0.400	13
3415.489	14.22	0.445	*08*	15.37	0.344	*20*	15.11	0.327	*04*	15.73	0.261	01	15.47	0.177	23
" .531	14.27	0.037	*10*	15.42	0.386	*18*	14.99	0.369	*19*	15.47	0.303	*30*	15.42	0.219	04
" .572	14.66	0.078	00	15.73	0.427	15	14.89	0.410	*30*	15.73	0.344	*06*	15.37	0.260	*12*
" .614	15.37	0.120	37	15.83	0.469	46	15.37	0.452	20	15.73	0.386	*03*	15.73	0.302	17
3419.548	14.22	0.008	00	14.17	0.036	*18*	14.27	0.544	07	15.73	0.365	*06*	15.47	0.412	*13*
3422.494	15.37	0.256	*12*	14.89	0.253	*55*	14.61	0.197	*33*	15.73	0.345	*06*	14.89	0.081	04
" .591	15.37	0.353	*16*	15.37	0.350	*21*	14.89	0.294	*23*	15.42	0.442	*03*	15.37	0.178	14
3423.506	15.21	0.369	*31*	14.89	0.173	*31*	14.61	0.112	*13*	15.83	0.368	03	14.27	0.000	02
3666.649	....	....	..	*16.0*	0.389	..	14.56	0.123	*19*	15.78	0.275	04	15.05	0.074	27
3673.681	15.27	0.099	46	15.47	0.324	*10*	14.61	0.020	29	15.73	0.385	*04*	14.27	0.006	*03*
3693.638	15.21	0.272	*29*	14.27	0.083	*37*	14.71	0.219	*29*	14.66	0.073	*03*	*15.3*	0.299	..
3694.577	....	....	..	14.66	0.476	*54*	14.56	0.060	02	14.66	0.023	30	15.16	0.145	03
" .615	15.73	0.349	20	14.89	0.514	40	14.89	0.098	20	14.66	0.061	04	15.61	0.183	35
3695.519	15.47	0.354	*06*	15.96	0.326	41	15.16	0.454	*01*	14.56	0.471	14	14.42	0.541	15
" .561	15.42	0.396	*06*	15.42	0.368	*16*	14.89	0.496	01	14.66	0.018	34	14.66	0.037	11
" .602	14.76	0.437	16	15.57	0.409	*03*	14.66	0.537	45	14.79	0.059	19	14.76	0.078	*05*
" .644	14.32	0.030	*01*	15.78	0.451	28	14.71	0.030	35	15.21	0.101	30	15.16	0.120	13
3698.504	14.94	0.192	*40*	14.61	0.036	26	14.89	0.146	06	14.89	0.489	64	15.42	0.249	*05*
3699.499	15.11	0.288	*41*	15.42	0.485	42	14.61	0.043	17	14.42	0.001	16	15.37	0.151	23
" .542	15.83	0.331	30	14.66	0.528	33	....	....	..	14.66	0.044	14	14.99	0.194	*31*
" .584	15.73	0.373	21	14.76	0.024	43	15.11	0.128	34	14.94	0.086	14	15.61	0.236	19
3713.513	15.37	0.363	*16*	15.42	0.305	*11*	14.89	0.336	*27*	15.73	0.172	37	14.89	0.510	*16*
" .680	14.66	0.080	*04*	14.99	0.472	*33*	14.56	0.503	*17*	15.78	0.339	*01*	15.05	0.130	*02*
3717.517	15.21	0.320	*32*	14.22	0.488	R	14.27	0.498	*61*	14.94	0.221	*65*	15.11	0.144	*01*
" .692	14.22	0.046	*22*	14.22	0.117	R	14.61	0.125	*15*	15.73	0.396	*03*	15.78	0.319	20
" .817	....	....	..	*15.6*	0.242	..	14.56	0.250	*50*	14.61	0.027	21	15.68	0.444	09
3724.535	14.94	0.144	*19*	15.27	0.409	*32*	15.11	0.382	*08*	15.99	0.318	21	14.99	0.061	28
" .676	15.37	0.285	*15*	14.27	0.004	*03*	14.42	0.523	15	14.56	0.459	*14*	15.11	0.202	*22*
3748.572	15.21	0.351	*32*	15.08	0.426	*50*	14.66	0.270	*42*	14.99	0.130	*11*	14.79	0.064	06
3775.556	15.37	0.357	*15*	14.66	0.115	*22*	14.89	0.361	*29*	....	....	..	15.30	0.283	*23*
3960.869	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
4014.745	15.42	0.341	*11*	....	....	..	....	....	..	15.21	0.325	*57*	15.21	0.227	*19*
4037.635	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
" .663	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
4041.675	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
4052.600	15.11	0.427	00	15.58	0.387	*02*	14.82	0.246	*22*	15.21	0.113	21	15.58	0.393	*03*
4058.548	14.99	0.081	31	15.58	0.330	02	15.26	0.157	42	15.26	0.128	19	15.26	0.332	*33*
" .662	15.58	0.195	23	15.98	0.444	43	15.26	0.271	18	15.83	0.242	16	15.47	0.446	*12*
" .780	15.58	0.313	05	14.51	0.016	20	15.37	0.389	18	15.83	0.360	04	14.40	0.018	02
" .854	15.47	0.387	*04*	15.26	0.090	56	15.11	0.463	*05*	15.58	0.434	*02*	14.89	0.092	*02*
4066.635	14.61	0.074	*04*	15.47	0.228	10	14.32	0.012	05	15.98	0.305	21	15.26	0.226	*13*
4067.636	15.47	0.176	20	14.89	0.137	*13*	15.06	0.464	*09*	15.98	0.317	20	15.06	0.135	*04*
4069.560	15.58	0.301	05	15.26	0.424	*32*	14.71	0.193	*23*	15.98	0.264	25	15.47	0.420	*14*

J. D.	No. 4. Per. 0d.449632			No. 5. Per. 0d.545903			No. 6. Per. 0d.54883			No. 7. Per. 0d.494383			No. 8. Per. 0d.546222		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
4069.795	14.71	0.087	*01*	14.71	0.113	*16*	14.99	0.428	*21*	14.22	0.004	*04*	14.71	0.109	*29*
4070.655	14.40	0.047	*04*	15.26	0.427	*32*	14.71	0.190	*22*	15.73	0.370	*04*	15.47	0.422	*13*
4071.538	14.40	0.031	07	15.21	0.218	*14*	14.12	0.524	*16*	15.83	0.264	10	15.37	0.213	00
" .747	15.37	0.240	*09*	15.37	0.427	*21*	14.82	0.184	*10*	14.12	0.473	*28*	15.58	0.422	*02*
4072.538	14.99	0.132	*07*	14.61	0.126	*35*	14.82	0.426	*38*	15.98	0.275	24	14.99	0.121	*04*
" .745	15.26	0.339	*27*	15.26	0.333	*30*	14.51	0.085	*12*	14.22	0.482	*06*	15.58	0.328	*01*
4073.553	15.73	0.248	25	14.40	0.049	*01*	14.82	0.344	*34*	15.98	0.302	20	14.61	0.043	01
" .758	14.61	0.003	40	15.37	0.254	*07*	14.22	0.549	02	14.32	0.012	02	15.47	0.248	01
4074.561	15.58	0.356	05	15.06	0.511	52	14.99	0.254	*06*	15.98	0.321	20	14.99	0.505	*16*
4085.663	15.58	0.218	16	15.26	0.149	14	15.21	0.380	02	14.61	0.052	04	15.11	0.136	00
4086.608	15.58	0.263	08	15.06	0.003	76	....	....	..	14.32	0.008	05	14.61	0.535	24
4092.573	15.47	0.383	*04*	15.11	0.509	59	15.06	0.155	21	14.22	0.041	*26*	15.26	0.492	*12*
4093.532	14.40	0.443	00	15.47	0.376	*13*	14.32	0.016	05	14.40	0.011	12	15.58	0.358	*03*
" .762	15.26	0.223	*18*	15.06	0.060	56	15.58	0.246	54	15.58	0.241	*10*	14.82	0.042	23
4133.607	14.17	0.051	*30*	14.22	0.054	*25*	14.32	0.026	*04*	14.61	0.041	12	14.32	0.013	*01*
4147.519	14.51	0.024	20	16.20	0.318	65	14.94	0.218	*04*	14.66	0.110	*32*	15.37	0.269	*13*
4437.629	14.66	0.122	*36*	14.17	0.008	*13*	14.22	0.545	02	14.32	0.017	*01*	15.78	0.335	18
4795.632	15.47	0.218	05	*16.0*	0.445	..	....	....	..	....	....	..	14.56	0.017	20
4846.568	15.47	0.345	*06*	14.32	0.066	*21*	14.51	0.057	*01*	14.66	0.102	*25*	15.11	0.154	*04*
4860.582	15.73	0.421	61	16.20	0.432	63	15.16	0.351	*01*	15.61	0.273	*12*	14.66	0.512	*34*
4876.513	14.99	0.165	*25*	14.51	0.532	20	14.89	0.365	*29*	15.47	0.384	*29*	14.89	0.057	22
4886.535	15.78	0.295	25	15.47	0.182	24	14.89	0.509	19	14.56	0.023	22	15.78	0.247	32
5560.608	15.83	0.370	31	14.71	0.065	18	14.99	0.069	41	15.83	0.252	13	15.61	0.282	09
5562.605	15.16	0.119	16	16.15	0.424	57	16.15	0.420	95	15.73	0.272	00	14.89	0.094	*02*
5563.594	15.78	0.208	38	16.3	0.321	..	15.47	0.311	33	15.47	0.272	*26*	14.89	0.537	55
5579.551	15.21	0.428	21	15.47	0.447	*05*	14.94	0.352	*23*	15.83	0.409	10	14.89	0.107	*09*
5581.558	15.21	0.187	*11*	15.21	0.270	*27*	14.89	0.164	02	15.37	0.438	*19*	15.37	0.47.	*15*
5899.564	15.37	0.303	*16*	14.56	0.015	25	14.99	0.397	*20*	14.66	0.062	03	14.45	0.034	*08*
5901.555	14.66	0.046	23	15.73	0.368	13	14.89	0.193	*05*	14.71	0.075	00	15.47	0.386	*14*
" .646	14.89	0.137	*19*	15.47	0.459	01	15.16	0.284	05	15.47	0.166	14	16.10	0.477	59
6633.655	15.16	0.147	03	....	....	..	14.99	0.154	13	14.17	0.488	*09*	14.56	0.003	28
6634.509	14.89	0.100	05	14.99	0.174	*22*	15.37	0.459	21	15.73	0.354	*06*	15.73	0.310	16
" .566	14.99	0.157	*21*	15.16	0.231	*23*	14.56	0.516	21	16.15	0.411	43	15.47	0.367	*14*
" .682	15.37	0.273	*14*	....	....	..	14.66	0.083	03	14.27	0.032	*16*	15.16	0.483	*31*
7021.639	14.71	0.097	*10*	15.47	0.259	01	14.66	0.115	*07*	15.73	0.382	*04*	15.16	0.169	*06*
7023.629	15.47	0.288	*05*	14.66	0.065	14	14.89	0.459	*27*	15.83	0.394	07	14.71	0.520	*05*
" .678	15.47	0.337	*07*	14.71	0.114	*16*	14.66	0.508	18	15.73	0.443	28	14.32	0.023	*10*
8157.558	15.73	0.245	25	15.16	0.154	04	14.89	0.505	39	15.37	0.209	*17*	15.73	0.492	35
9533.816	15.73	0.180	43	15.73	0.191	46	15.37	0.297	25	14.99	0.104	04	15.37	0.271	*14*
" .888	15.73	0.252	24	15.83	0.263	36	15.37	0.369	19	15.37	0.176	00	15.61	0.343	01
" .914	15.47	0.278	*05*	15.47	0.289	*03*	15.37	0.395	18	15.16	0.202	*35*	15.73	0.369	12
" .947	16.10	0.311	56	15.83	0.322	28	15.47	0.428	27	15.47	0.235	*17*	15.37	0.402	*24*
9537.761	14.71	0.078	04	16.10	0.314	56	15.37	0.400	18	14.56	0.094	*30*	15.47	0.392	*14*
" .786	14.71	0.103	*14*	15.78	0.339	21	15.16	0.425	*04*	14.76	0.119	*26*	15.73	0.417	12
" .812	14.99	0.129	*04*	15.83	0.365	24	15.47	0.451	30	14.66	0.145	*54*	15.47	0.443	*13*
" .836	15.37	0.153	19	15.73	0.389	13	15.37	0.475	24	14.99	0.169	*35*	15.73	0.467	19
" .874	15.73	0.191	40	16.51	0.427	92	14.99	0.513	54	15.16	0.207	*36*	15.16	0.505	00
" .899	15.73	0.216	31	16.20	0.452	70	14.66	0.538	45	15.47	0.232	*16*	14.66	0.530	16
" .924	15.73	0.241	25	15.83	0.477	68	14.56	0.014	29	15.73	0.257	02	14.22	0.009	*10*
" .950	15.83	0.267	32	14.89	0.503	27	14.66	0.040	22	15.47	0.283	*29*	14.27	0.035	*25*

J. D.	No. 9. Per. 0d.698894			No. 10. Per. 0d.530664			No. 11. Per. 0d.595894			No. 12. Per. 0d.467722			No. 13. Per. 0d.513121			No. 14. Per. 0d.487240		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
1145.794	....	....	..	*15.1*	0.411	..	13.73	0.004	*41*	....	....	..	13.88	0.492	45	....	....	..
1148.796	....	....	..	*15.1*	0.229	..	14.27	0.027	05	14.94	0.006	71	14.56	0.415	*61*	14.66	0.401	*51*
1155.796	....	....	..	14.66	0.330	*76*	15.16	0.472	*26*	....	....	..	14.61	0.232	*55*	....	....	..
1161.809	....	....	..	14.56	0.506	16	15.11	0.526	*28*	15.16	0.391	*57*	14.56	0.087	*07*	14.94	0.259	*44*
1174.794	14.66	0.034	20	*14.9*	0.224	..	....	....	..	....	....	..	....	....	..	....	....	..
1178.785	....	....	..	14.66	0.500	11	14.94	0.221	*14*	....	....	..	14.66	0.130	*19*	....	....	..
1199.701	14.94	0.480	*53*	15.16	0.190	01	14.89	0.281	*36*	15.16	0.397	*48*	14.17	0.008	*05*	15.11	0.146	02
3346.540	15.37	0.316	10	14.66	0.493	*24*	14.51	0.113	*11*	15.73	0.392	00	14.66	0.462	*15*	15.73	0.205	43
3366.544	14.61	0.052	10	15.42	0.332	*01*	15.21	0.453	*21*	15.73	0.284	02	14.94	0.454	00	15.21	0.233	*15*
3369.698	15.16	0.411	*26*	*15.3*	0.302	..	14.17	0.032	*05*	....	....	..	13.88	0.017	*35*	14.56	0.463	01
3370.528	15.47	0.542	*03*	14.66	0.070	11	15.11	0.266	*09*	14.71	0.058	06	15.11	0.333	*15*	15.26	0.319	*14*
3371.529	14.89	0.145	13	14.22	0.010	02	14.56	0.075	14	14.99	0.124	*12*	14.99	0.308	*27*	15.21	0.345	*19*
3374.502	15.37	0.323	08	15.47	0.330	04	14.27	0.068	*12*	15.73	0.291	01	15.11	0.203	00	15.04	0.395	*16*
" .538	....	....	..	*15.3*	0.366	..	14.66	0.104	07	....	....	..	15.11	0.239	*05*	14.89	0.431	01
3376.502	14.99	0.226	*03*	15.09	0.207	*09*	15.32	0.281	08	15.37	0.420	27	14.99	0.150	04	14.89	0.446	19
" .543	15.11	0.267	*02*	15.37	0.248	10	15.21	0.322	*11*	14.27	0.461	06	14.99	0.191	*06*	14.56	0.487	06
" .584	15.37	0.308	14	15.83	0.289	46	15.42	0.363	05	14.61	0.034	14	15.21	0.232	05	14.56	0.040	*01*
" .677	15.42	0.401	01	14.94	0.382	*53*	15.21	0.456	*21*	15.11	0.127	00	15.16	0.325	*10*	14.89	0.133	*14*
3377.578	15.37	0.603	00	15.04	0.222	*19*	14.89	0.165	04	14.89	0.093	*03*	14.99	0.200	*11*	14.56	0.060	*08*
3378.579	14.89	0.206	*07*	14.99	0.162	*04*	14.56	0.570	*04*	15.21	0.158	*09*	15.21	0.175	18	14.66	0.087	*11*
3380.500	14.27	0.031	*19*	14.94	0.491	*06*	14.56	0.107	*03*	15.73	0.208	19	14.56	0.043	18	14.27	0.059	*37*
" .602	14.66	0.133	*07*	14.32	0.062	*20*	15.37	0.209	35	15.47	0.310	*26*	14.66	0.145	*27*	14.89	0.161	*25*
3390.604	15.42	0.350	08	14.56	0.512	32	14.61	0.081	15	14.27	0.022	*08*	14.99	0.398	*23*	15.16	0.418	10
3408.568	14.89	0.143	13	15.16	0.433	*31*	14.89	0.168	02	15.73	0.213	17	15.47	0.403	27	15.37	0.354	*02*
3409.544	15.42	0.420	00	15.16	0.348	*28*	15.16	0.549	*03*	15.73	0.254	06	14.99	0.352	*27*	15.04	0.355	*36*
" .623	15.73	0.499	24	15.42	0.427	*05*	14.17	0.032	*05*	15.73	0.333	*01*	15.42	0.431	30	14.66	0.434	*19*
3411.603	15.47	0.382	08	15.37	0.284	01	15.42	0.224	34	14.27	0.442	*05*	15.73	0.359	48	14.61	0.465	07
3412.560	14.89	0.640	14	15.11	0.180	00	14.27	0.585	10	14.12	0.463	*08*	15.42	0.290	18	14.56	0.448	*12*
3413.569	15.16	0.252	06	14.89	0.128	00	15.47	0.402	07	14.66	0.069	*07*	15.21	0.272	*02*	14.56	0.482	06
3414.620	15.37	0.604	00	14.71	0.117	*15*	15.37	0.262	17	15.37	0.185	*06*	15.37	0.297	13	14.61	0.072	*09*
3415.489	14.66	0.075	10	15.47	0.456	01	15.37	0.535	00	14.94	0.118	*12*	14.89	0.140	*02*	14.66	0.454	05
" .531	14.66	0.117	*01*	14.94	0.498	24	14.56	0.577	16	15.21	0.160	*10*	14.99	0.182	*05*	14.56	0.008	06
" .572	14.89	0.158	08	14.27	0.008	07	14.17	0.022	*02*	15.37	0.201	*14*	14.99	0.223	*15*	14.56	0.049	*04*
" .614	15.11	0.200	16	14.56	0.050	12	14.51	0.064	13	15.42	0.243	*23*	14.94	0.265	*27*	14.66	0.091	*14*
3419.548	14.99	0.639	21	15.21	0.269	*12*	15.21	0.422	*20*	14.56	0.435	*06*	14.61	0.094	*07*	15.16	0.127	17
3422.494	14.89	0.091	29	14.51	0.031	19	15.37	0.389	*02*	14.99	0.107	*02*	14.56	0.474	*09*	14.89	0.150	*22*
" .591	15.21	0.188	29	14.89	0.128	*01*	15.37	0.486	*04*	15.73	0.204	20	14.27	0.058	*17*	15.37	0.247	*01*
3423.506	15.37	0.404	*04*	14.61	0.513	38	14.94	0.209	*08*	15.47	0.184	*01*	14.66	0.460	*18*	15.26	0.187	02
3666.649	15.61	0.332	30	14.89	0.081	26	14.66	0.227	*42*	16.4	0.111	..	14.94	0.384	*29*	15.78	0.198	50
3673.681	15.37	0.375	*01*	15.21	0.214	01	14.66	0.109	06	15.42	0.128	31	15.11	0.232	*05*	15.37	0.408	24
3693.638	14.66	0.064	13	14.27	0.006	09	15.26	0.401	*14*	14.56	0.440	16	14.42	0.177	*61*	15.21	0.388	*06*
3694.577	15.21	0.304	*02*	15.21	0.414	*26*	15.21	0.148	44	14.17	0.444	*11*	14.22	0.090	*42*	15.16	0.353	*23*
" .615	15.30	0.342	*03*	15.61	0.452	14	14.94	0.186	00	14.39	0.014	09	14.66	0.128	*18*	15.05	0.391	*18*
3695.519	16.10	0.547	60	15.42	0.295	04	15.47	0.494	06	14.27	0.450	03	14.27	0.006	07	15.42	0.321	02
" .561	15.47	0.589	00	15.37	0.337	*06*	15.57	0.536	21	14.66	0.025	28	14.66	0.048	26	15.21	0.363	*17*
" .602	14.79	0.630	*13*	15.21	0.378	*26*	14.56	0.577	21	14.76	0.066	05	14.89	0.089	26	15.05	0.404	*12*
" .644	14.56	0.672	10	15.61	0.420	14	14.27	0.023	07	15.61	0.108	59	14.61	0.131	*25*	14.66	0.446	*05*
3698.504	14.89	0.038	42	14.89	0.096	17	15.11	0.500	*29*	15.42	0.161	10	14.61	0.425	*53*	15.42	0.382	13
3699.499	15.37	0.334	05	14.42	0.030	10	14.99	0.303	*30*	15.78	0.221	19	15.11	0.394	*11*	15.30	0.403	13
" .542	15.08	0.377	*30*	14.66	0.073	08	15.16	0.346	*18*	15.96	0.264	27	15.08	0.437	01	14.94	0.446	24

J. D.	No. 9.	Per. $0^d.698894$		No. 10.	Per. $0^d.530664$		No. 11.	Per. $0^d.595894$		No. 12.	Per. $0^d.467722$		No. 13.	Per. $0^d.513121$		No. 14.	Per. $0^d.487240$	
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res,	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
3699.584	15.42	0.419	00	14.76	0.115	07	15.57	0.388	18	15.73	0.306	00	14.71	0.479	11	14.56	0.000	06
3713.513	15.37	0.370	01	15.30	0.247	02	14.17	0.016	00	15.61	0.203	08	14.39	0.041	02	15.42	0.287	02
" .680	15.83	0.537	33	15.73	0.414	26	14.89	0.183	04	15.78	0.370	02	14.61	0.208	50	14.17	0.454	47
3717.517	14.94	0.181	04	14.27	0.005	09	15.21	0.444	21	14.27	0.465	07	14.56	0.453	38	15.30	0.393	08
" .692	15.47	0.356	13	15.27	0.180	17	14.17	0.023	03	15.21	0.173	14	15.37	0.115	57	14.89	0.080	16
" .817	15.42	0.481	06	15.7	0.305	..	14.61	0.148	17	15.42	0.298	30	15.42	0.240	25	15.42	0.205	12
3724.535	15.30	0.210	32	14.99	0.125	11	15.30	0.312	00	14.27	0.468	07	14.89	0.287	35	14.99	0.102	10
" .676	15.47	0.351	13	15.37	0.266	04	15.37	0.453	05	15.27	0.141	07	14.99	0.428	14	15.11	0.243	27
3748.572	15.42	0.484	06	15.42	0.282	07	15.21	0.513	19	15.78	0.183	35	14.99	0.207	12	15.21	0.264	17
3775.556	15.05	0.211	07	15.33	0.202	15	14.56	0.086	08	15.57	0.039	R	14.12	0.509	08	14.79	0.450	13
3960.869	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
4014.745	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
4037.635	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
" .663	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
4041.675	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
4052.600	15.47	0.493	01	15.26	0.239	00	14.32	0.039	07	15.26	0.192	21	14.71	0.468	03	15.26	0.255	12
4058.548	14.71	0.151	07	15.26	0.350	19	14.12	0.028	09	14.71	0.059	05	15.26	0.258	05	15.26	0.356	13
" .662	14.82	0.265	31	15.26	0.464	16	14.71	0.142	05	15.37	0.173	00	15.26	0.372	02	14.40	0.470	13
" .780	15.21	0.383	19	14.32	0.051	13	15.26	0.260	07	15.37	0.291	35	14.61	0.490	19	14.82	0.100	05
" .854	15.21	0.457	26	14.61	0.125	27	15.47	0.334	13	15.73	0.365	03	14.82	0.051	40	14.99	0.174	21
4066.635	15.37	0.551	13	15.37	0.477	02	15.47	0.369	09	15.58	0.195	09	14.82	0.135	08	15.06	0.160	08
4067.636	14.82	0.154	03	15.58	0.417	11	14.99	0.178	08	15.83	0.261	15	14.82	0.110	05	15.26	0.186	03
4069.560	14.40	0.680	03	15.26	0.218	05	15.26	0.314	05	15.58	0.314	16	14.32	0.495	01	15.11	0.161	03
" .795	14.89	0.216	11	15.58	0.453	12	15.47	0.549	30	14.71	0.081	12	14.82	0.217	31	15.37	0.396	17
4070.655	15.26	0.377	13	15.26	0.252	04	15.06	0.217	00	14.12	0.006	11	14.40	0.050	01	15.37	0.282	02
4071.538	15.47	0.561	02	14.51	0.073	06	15.47	0.504	06	14.99	0.421	02	14.99	0.420	17	15.26	0.190	01
" .747	14.51	0.071	03	15.37	0.282	01	14.61	0.117	02	15.37	0.162	05	14.82	0.116	02	15.21	0.399	02
4072.538	14.82	0.163	01	14.22	0.012	00	15.11	0.313	19	14.22	0.018	10	15.06	0.394	17	15.37	0.216	05
" .745	15.26	0.370	12	15.26	0.219	05	15.47	0.520	07	15.73	0.225	13	14.40	0.088	24	14.82	0.423	18
4073.553	15.26	0.480	22	14.51	0.496	29	14.82	0.136	11	15.06	0.097	11	15.06	0.383	18	15.37	0.256	01
" .758	14.32	0.685	10	15.06	0.171	00	15.26	0.341	09	15.83	0.302	10	14.51	0.075	04	14.32	0.461	24
4074.561	14.61	0.090	00	15.37	0.443	10	15.11	0.548	09	15.37	0.170	01	14.99	0.364	25	15.21	0.290	19
4085.663	14.40	0.009	00	15.21	0.401	26	15.21	0.328	12	14.61	0.047	04	15.11	0.178	08	15.21	0.185	02
4086.608	15.06	0.256	06	15.26	0.285	09	14.40	0.081	06	14.82	0.056	18	15.11	0.097	41	15.06	0.156	07
4092.573	14.82	0.629	10	15.26	0.412	21	14.40	0.087	09	15.47	0.408	00	15.26	0.417	09	15.37	0.274	02
4093.532	14.89	0.191	03	15.37	0.310	03	15.26	0.450	16	14.51	0.432	10	15.06	0.350	20	15.47	0.258	08
" .762	15.58	0.421	15	13.93	0.009	27	14.32	0.084	16	15.98	0.194	49	14.51	0.067	01	14.22	0.001	28
4133.607	14.51	0.429	R	14.51	0.055	04	14.17	0.004	03	15.83	0.283	12	15.21	0.402	00	15.83	0.380	52
4147.519	15.37	0.363	00	14.89	0.169	15	14.99	0.211	04	15.42	0.163	09	14.94	0.459	04	14.89	0.162	26
4437.629	15.42	0.432	01	14.27	0.006	09	14.66	0.121	00	15.78	0.286	06	14.66	0.143	27	14.99	0.364	38
4795.632	15.42	0.601	01	15.37	0.342	07	14.17	0.587	01	14.27	0.014	04	14.27	0.500	03	15.27	0.246	10
4846.568	15.78	0.518	29	15.47	0.334	02	15.27	0.276	03	14.51	0.436	00	14.61	0.124	22	14.51	0.021	01
4860.582	15.61	0.554	11	14.27	0.020	00	14.27	0.584	11	15.37	0.418	17	15.47	0.284	24	14.56	0.393	67
4876.513	15.37	0.410	05	14.32	0.031	01	15.42	0.426	01	14.27	0.446	00	15.37	0.308	11	15.73	0.245	36
4886.535	14.71	0.648	06	14.89	0.501	34	14.99	0.318	32	15.42	0.178	02	14.99	0.068	47	14.56	0.035	00
5560.608	15.37	0.288	17	14.66	0.100	09	15.16	0.435	26	15.83	0.264	14	14.99	0.413	18	15.47	0.255	09
5562.605	14.89	0.188	03	14.56	0.505	16	14.56	0.049	26	15.73	0.390	00	15.30	0.358	05	15.47	0.303	07
5563.594	15.37	0.479	10	15.47	0.433	00	15.37	0.442	05	14.61	0.444	31	15.37	0.320	11	15.42	0.317	02
5579.551	15.11	0.361	25	14.89	0.470	51	15.21	0.310	09	14.22	0.030	21	15.11	0.371	13	15.32	0.195	05
5581.558	15.11	0.271	03	15.61	0.354	16	15.47	0.529	10	15.11	0.167	23	15.04	0.325	22	15.30	0.253	08

J. D.	No. 9. Per. 0d.698894			No. 10. Per. 0d.530664			No. 11. Per. 0d.595894			No. 12. Per. 0d.467722			No. 13. Per. 0d.513121			No. 14. Per. 0d.487240		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
5899.564	15.16	0.281	02	14.89	0.493	01	15.16	0.328	17	14.99	0.122	11	14.89	0.196	19	14.89	0.092	08
5901.555	14.89	0.175	02	15.47	0.361	01	15.47	0.531	10	15.83	0.242	19	14.89	0.135	00	14.99	0.134	03
" .646	15.11	0.266	02	15.47	0.452	00	14.17	0.026	04	15.83	0.333	07	14.99	0.226	16	15.16	0.225	18
6633.655	15.47	0.533	03	14.89	0.145	08	14.99	0.277	25	15.73	0.357	03	14.27	0.011	06	14.66	0.399	52
6634.509	14.51	0.688	09	15.47	0.468	05	15.47	0.535	11	15.83	0.275	14	14.89	0.352	36	15.47	0.279	07
" .566	14.51	0.046	02	14.12	0.525	02	14.12	0.592	00	15.73	0.332	01	14.99	0.409	19	15.61	0.336	21
" .682	14.89	0.162	07	14.71	0.110	11	14.71	0.112	10	14.32	0.448	08	14.22	0.012	01	14.12	0.452	53
7021.639	14.79	0.631	11	15.30	0.213	10	15.37	0.334	03	15.04	0.132	10	14.66	0.075	11	14.79	0.053	17
7023.629	15.47	0.524	03	14.56	0.081	07	15.37	0.536	02	15.83	0.251	16	14.56	0.013	35	14.99	0.094	18
" .678	15.61	0.573	12	14.89	0.130	02	14.17	0.585	01	15.73	0.300	00	14.66	0.062	17	15.37	0.143	30
8157.558	14.89	0.148	12	14.27	0.511	02	15.47	0.479	05	15.27	0.422	27	14.89	0.458	00	15.27	0.216	05
9533.816	15.16	0.284	02	15.47	0.227	23	15.16	0.222	09	15.47	0.174	10	14.56	0.012	35	14.66	0.021	14
" .888	15.16	0.356	18	15.73	0.299	35	15.61	0.294	33	15.83	0.246	17	14.89	0.084	26	14.89	0.093	08
" .914	15.37	0.382	03	....	....	..	15.47	0.320	15	15.73	0.272	03	14.99	0.110	22	15.08	0.119	13
" .947	14.99	0.415	44	15.47	0.358	01	15.47	0.353	10	15.47	0.305	26	15.47	0.143	54	15.05	0.152	07
9537.761	14.51	0.035	05	15.47	0.457	01	14.12	0.592	00	15.73	0.377	02	15.47	0.365	22	14.71	0.068	05
" .786	14.56	0.060	03	15.37	0.482	12	14.17	0.021	02	15.83	0.402	29	15.47	0.390	24	14.89	0.093	09
" .812	14.61	0.086	03	14.17	0.508	13	14.51	0.047	22	15.37	0.428	52	15.47	0.416	29	14.89	0.119	06
" .836	14.56	0.110	09	14.12	0.001	05	14.51	0.071	10	14.32	0.452	10	15.61	0.440	54	14.99	0.143	08
" .874	14.71	0.148	06	14.56	0.039	19	14.66	0.109	05	14.32	0.022	05	14.56	0.478	03	14.99	0.181	24
" .899	14.66	0.173	21	14.66	0.064	14	14.66	0.134	06	14.71	0.047	14	14.32	0.503	10	15.37	0.206	07
" .924	15.16	0.198	23	14.99	0.089	33	14.99	0.159	17	14.99	0.072	22	14.32	0.015	10	15.47	0.231	11
" .950	14.79	0.224	24	14.99	0.115	16	14.99	0.185	05	14.89	0.098	06	14.56	0.041	19	15.47	0.257	09

J. D.	No. 15. Per. 0d.507743			No. 16. Per. 0d.647622			No. 17. Per. not det'd.			No. 18. Per. 0d.464007			No. 19. Per. 0d.469952			No. 20. Per. 0d.609480		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
1145.794	14.66	0.472	22	....	....	..	....	....	..	....	....	..	14.66	0.454	28	....	....	..
1148.796	14.66	0.428	46	....	....	..	....	....	..	15.16	0.426	11	14.99	0.166	35	....	....	..
1155.796	....	....	..	14.27	0.086	15	....	....	..	15.0	0.002	..	....	....	..	....	....	..
1161.809	....	....	..	14.94	0.270	28	....	....	..	15.11	0.447	36	14.27	0.021	06	14.94	0.108	30
1174.794	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
1178.785	14.66	0.460	28	15.16	0.408	27	14.66	....	..	15.1	0.255	..	14.94	0.078	14	14.56	0.019	23
1199.701	14.99	0.050	16	14.61	0.600	05	14.56	....	..	15.6	0.290	..	....	....	..	14.89	0.213	09
3346.540	14.66	0.152	37	15.37	0.572	01	14.17	....	..	15.47	0.169	19	15.73	0.415	36	15.42	0.463	12
3366.544	15.21	0.354	07	15.73	0.500	23	15.11	....	..	15.47	0.221	04	15.73	0.211	17	15.21	0.354	04
3369.698	15.11	0.462	18	15.42	0.416	01	14.94	....	..	15.16	0.126	02	14.66	0.075	11	....	....	..
3370.528	15.11	0.276	17	14.56	0.598	17	14.27	....	..	14.27	0.028	37	14.66	0.435	01	14.27	0.072	26
3371.529	15.11	0.261	15	15.11	0.304	19	15.37	....	..	14.71	0.101	32	14.27	0.026	06	15.37	0.463	07
3374.502	14.94	0.188	19	14.17	0.039	09	15.42	....	..	15.47	0.290	00	15.37	0.180	05	15.21	0.389	07
" .538	14.99	0.224	21	14.37	0.075	01	....	....	..	15.3	0.326	..	15.47	0.216	10	15.42	0.425	13
3376.502	14.66	0.157	38	14.66	0.096	16	15.73	....	..	15.42	0.434	25	15.47	0.300	26	15.11	0.561	31
" .543	14.89	0.198	25	14.89	0.137	19	14.56	....	..	14.27	0.011	34	15.73	0.341	02	14.32	0.602	00
" .584	15.21	0.239	01	15.11	0.178	19	14.66	....	..	14.56	0.052	15	15.73	0.382	05	14.51	0.033	12
" .677	15.21	0.332	09	15.21	0.271	02	14.61	....	..	15.16	0.145	05	14.22	0.005	08	14.56	0.126	16
3377.578	14.94	0.218	24	15.73	0.525	23	15.73	....	..	14.99	0.118	12	14.61	0.436	00	15.11	0.418	18
3378.579	14.99	0.203	17	15.11	0.230	00	15.11	....	..	15.47	0.191	11	14.27	0.027	07	14.89	0.200	06
3380.500	14.89	0.093	00	15.04	0.208	01	15.47	....	..	15.73	0.256	29	14.56	0.068	12	14.94	0.292	22
" .602	14.99	0.195	15	15.37	0.310	07	15.52	....	..	15.47	0.358	00	15.37	0.170	02	15.37	0.394	09
3390.604	14.89	0.042	07	14.66	0.598	04	14.61	....	..	15.37	0.152	13	15.78	0.303	05	14.56	0.035	16

J. D.	No. 15. Per. 0d.507743			No. 16. Per. 0d.647622			No. 17. Per. not det'd.			No. 18. Per. 0d.464007			No. 19. Per. 0d.469952			No. 20. Per. 0d.609480		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
3408.568	15.16	0.235	*06*	15.47	0.429	01	15.37	....	..	14.27	0.020	*36*	15.42	0.409	*09*	15.11	0.324	*10*
3409.544	14.94	0.196	*20*	14.56	0.109	00	15.73	....	..	14.89	0.068	11	14.56	0.445	09	14.56	0.081	00
" .623	15.42	0.275	14	14.89	0.188	*06*	14.56	....	..	15.37	0.147	15	14.56	0.054	00	14.89	0.160	06
3411.603	15.37	0.224	17	15.47	0.226	36	14.89	....	..	15.47	0.271	00	15.42	0.154	15	15.37	0.312	17
3412.560	14.89	0.165	*17*	15.73	0.535	23	15.73	....	..	15.47	0.300	00	15.37	0.172	*02*	14.56	0.050	12
3413.569	14.89	0.159	*15*	15.11	0.249	*06*	15.83	....	..	15.73	0.381	27	15.73	0.241	10	15.37	0.449	07
3414.620	15.21	0.194	08	14.22	0.004	01	15.21	....	..	14.56	0.040	*12*	15.47	0.352	*26*	14.99	0.281	*15*
3415.489	14.89	0.048	07	14.94	0.226	*16*	15.73	....	..	14.56	0.445	*34*	15.73	0.281	02	15.47	0.541	40
" .531	14.89	0.090	00	14.99	0.268	*23*	15.73	....	..	14.27	0.023	*36*	15.73	0.323	*01*	14.66	0.583	14
" .572	14.89	0.131	*07*	15.11	0.309	*19*	15.47	....	..	14.89	0.064	11	15.73	0.364	00	14.27	0.014	*06*
" .614	15.11	0.173	02	15.11	0.351	*26*	14.61	....	..	15.11	0.106	07	15.78	0.406	25	14.56	0.056	10
3419.548	14.89	0.045	07	15.21	0.399	*22*	14.99	....	..	15.47	0.328	00	15.21	0.110	16	15.21	0.333	*02*
3422.494	15.37	0.452	39	14.56	0.107	01	14.61	....	..	14.32	0.026	*31*	15.47	0.237	*16*	14.99	0.232	*04*
" .591	14.99	0.041	17	14.99	0.204	*03*	14.66	....	..	15.37	0.123	23	....	....	..	15.42	0.329	20
3423.506	15.11	0.449	11	15.16	0.471	*32*	14.27	....	..	15.11	0.110	04	15.42	0.309	*31*	14.22	0.025	*15*
3666.649	15.78	0.383	52	14.61	0.109	07	14.61	....	..	15.05	0.113	*02*	14.66	0.016	34	14.66	0.595	28
3673.681	14.89	0.306	*41*	14.17	0.017	*05*	14.32	....	..	15.47	0.185	13	14.32	0.469	01	15.05	0.313	*14*
3693.638	15.16	0.462	23	15.16	0.545	*32*	14.66	....	..	*15.3*	0.190	..	15.36	0.218	*22*	14.66	0.157	*17*
3694.577	15.16	0.385	*09*	15.05	0.189	10	14.22	....	..	15.83	0.201	45	15.42	0.217	*16*	15.21	0.487	*09*
" .615	15.30	0.423	16	15.21	0.227	11	15.11	....	..	15.61	0.239	17	15.61	0.255	*06*	15.42	0.525	15
3695.519	15.05	0.311	*25*	15.21	0.483	*28*	14.89	....	..	15.47	0.215	05	15.83	0.219	25	15.05	0.210	08
" .561	15.21	0.353	*08*	15.30	0.525	*20*	15.16	....	..	15.73	0.257	28	15.61	0.261	*07*	15.11	0.252	04
" .602	15.30	0.394	07	15.42	0.566	01	14.89	....	..	15.61	0.298	14	15.93	0.302	20	15.16	0.293	00
" .644	15.01	0.436	*07*	14.56	0.608	03	15.21	....	..	15.73	0.340	26	16.15	0.344	40	15.21	0.335	*02*
3698.504	15.42	0.250	18	15.37	0.230	25	14.61	....	..	14.94	0.416	*39*	15.37	0.385	*30*	14.89	0.148	09
3699.499	15.05	0.229	*16*	15.27	0.577	00	14.89	....	..	14.79	0.019	17	14.61	0.440	07	15.21	0.533	03
" .542	15.57	0.272	29	14.27	0.620	*02*	14.76	....	..	14.79	0.062	03	14.39	0.013	07	14.89	0.576	29
" .584	15.30	0.314	00	14.27	0.015	06	15.05	....	..	15.37	0.104	34	14.66	0.055	10	14.51	0.009	20
3713.513	14.94	0.027	14	15.21	0.344	*15*	14.56	....	..	14.99	0.112	*10*	15.73	0.355	*01*	15.42	0.529	21
" .680	15.11	0.194	*02*	15.30	0.511	*20*	14.66	....	..	15.21	0.279	*26*	14.51	0.052	*01*	14.76	0.087	19
3717.517	15.21	0.477	35	15.37	0.462	*11*	14.61	....	..	15.30	0.404	*08*	15.30	0.130	13	15.08	0.267	*03*
" .692	15.16	0.144	14	14.17	0.637	*04*	14.27	....	..	15.11	0.115	00	15.78	0.305	05	15.37	0.442	07
" .817	15.05	0.269	*22*	14.17	0.114	*41*	14.17	....	..	14.99	0.240	*44*	15.37	0.430	57	14.94	0.567	21
3724.535	15.11	0.386	*14*	15.37	0.356	*01*	14.89	....	..	14.61	0.462	01	15.08	0.098	12	14.66	0.580	13
" .676	14.76	0.019	*04*	15.42	0.497	*07*	15.37	....	..	14.99	0.139	*21*	15.73	0.239	10	14.73	0.112	07
3748.572	14.89	0.051	06	15.16	0.431	*30*	14.99	....	..	15.64	0.371	17	15.11	0.168	*24*	15.11	0.238	08
3775.556	14.89	0.125	*06*	15.37	0.215	30	15.30	....	..	14.89	0.442	*16*	16.15	0.365	42	15.33	0.405	04
3960.869	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	15.47	0.436	17
4014.745	15.08	0.167	01	....	....	..	....	....	..	15.11	0.204	*27*	15.47	0.348	*28*	15.16	0.068	R
4037.635	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	15.47	0.408	18
" .663	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	15.21	0.436	*09*
4041.675	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	14.99	0.181	10
4052.600	15.06	0.449	06	14.32	0.077	*06*	14.82	....	..	14.89	0.010	28	15.26	0.137	05	14.82	0.136	06
4058.548	15.26	0.304	*04*	14.89	0.196	*09*	14.51	....	..	15.47	0.390	02	14.40	0.445	*10*	14.27	0.598	*09*
" .662	14.89	0.418	*26*	15.26	0.310	*04*	15.37	....	..	14.82	0.040	14	14.89	0.090	*02*	14.40	0.103	*23*
" .780	14.82	0.028	02	15.58	0.428	12	15.98	....	..	15.21	0.158	*05*	15.58	0.208	03	14.89	0.221	*11*
4058.854	15.06	0.102	14	15.47	0.502	*03*	15.98	....	..	15.11	0.232	*32*	15.47	0.282	*24*	15.11	0.295	*06*
4066.635	15.26	0.267	*01*	15.26	0.512	*24*	15.26	....	..	14.99	0.125	*15*	14.89	0.073	16	14.82	0.153	00
4067.636	15.21	0.253	*04*	14.99	0.217	*07*	14.82	....	..	15.11	0.198	*26*	15.26	0.134	08	14.99	0.544	*03*
4069.560	14.82	0.146	*19*	14.82	0.199	*18*	15.11	....	..	15.26	0.266	*20*	15.47	0.179	04	14.40	0.030	02

J. D.	No. 15.	Per. $0^d.507743$		No. 16.	Per. $0^d.647622$		No. 17.	Per. not det'd.		No. 18.	Per. $0^d.464007$		No. 19.	Per. $0^d.469952$		No. 20.	Per. $0^d.609480$	
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
4069.795	14.71	0.381	*54*	15.26	0.434	*20*	15.47	....	..	14.66	0.037	*01*	15.58	0.414	14	15.21	0.265	11
4070.655	15.21	0.225	01	14.04	0.646	*16*	14.61	....	..	15.21	0.433	00	15.83	0.334	08	15.26	0.516	*02*
4071.538	14.71	0.093	*19*	14.82	0.234	*31*	15.26	....	..	15.58	0.388	14	15.98	0.277	29	14.82	0.180	*07*
" .747	15.26	0.302	*04*	15.26	0.443	*21*	14.71	....	..	14.82	0.133	*35*	14.17	0.016	*15*	15.26	0.389	*02*
4072.538	14.82	0.077	*05*	14.82	0.586	*23*	....	....	..	15.06	0.460	46	15.73	0.337	*02*	14.66	0.570	*02*
" .745	15.26	0.284	*03*	14.51	0.146	*24*	15.58	....	..	15.06	0.203	*32*	14.82	0.074	04	14.99	0.168	14
4073.553	14.82	0.077	*04*	14.66	0.306	R	14.61	....	..	14.66	0.083	*24*	15.98	0.412	54	15.21	0.366	*06*
" .758	15.26	0.282	*03*	15.37	0.511	*13*	15.06	....	..	15.37	0.288	*10*	15.26	0.147	00	14.82	0.571	14
4074.561	14.82	0.069	*02*	14.04	0.019	*19*	15.37	....	..	15.11	0.163	*16*	14.17	0.010	*14*	14.66	0.155	*16*
4085.663	14.82	0.001	02	14.71	0.111	15	14.82	....	..	14.99	0.129	*16*	15.73	0.303	*01*	15.06	0.287	*09*
4086.608	14.99	0.438	*09*	15.73	0.408	30	....	....	..	14.71	0.146	*50*	15.58	0.308	*16*	14.27	0.013	*06*
4092.573	15.26	0.310	*04*	15.58	0.545	09	15.58	....	..	14.71	0.079	*14*	15.58	0.164	24	15.26	0.493	*04*
4093.532	15.11	0.254	*14*	14.89	0.209	*14*	14.71	....	..	14.82	0.110	*22*	15.98	0.183	53	15.06	0.233	03
" .762	14.82	0.484	*01*	15.58	0.439	13	15.58	....	..	15.42	0.340	*05*	15.06	0.413	*39*	15.26	0.463	*04*
4133.607	14.99	0.217	*19*	14.66	0.131	00	15.21	....	..	15.11	0.280	*35*	15.42	0.312	*32*	14.56	0.082	00
4147.519	14.94	0.420	*21*	15.37	0.443	*10*	14.89	....	..	15.37	0.272	*09*	14.89	0.126	*25*	14.61	0.585	10
4437.629	14.89	0.101	*02*	15.37	0.418	*06*	14.89	....	..	15.47	0.377	00	16.3	0.275	..	14.51	0.583	00
4795.632	14.66	0.145	*35*	15.42	0.286	18	....	....	..	14.66	0.167	*62*	15.16	0.175	*25*	14.66	0.212	*31*
4846.568	15.37	0.307	07	14.27	0.060	*06*	15.37	....	..	15.47	0.062	71	15.47	0.356	*27*	14.61	0.561	*19*
4860.582	14.61	0.104	*31*	15.93	0.474	44	16.15	....	..	15.47	0.156	24	15.37	0.271	*32*	14.71	0.557	*20*
4876.513	15.21	0.295	*09*	15.21	0.215	14	14.56	....	..	14.99	0.311	*48*	16.10	0.224	51	14.51	0.032	12
4886.535	14.99	0.162	*07*	15.83	0.522	33	15.83	....	..	15.78	0.125	R	15.42	0.377	*28*	14.99	0.302	*19*
5560.608	14.79	0.461	*14*	15.47	0.421	02	16.3	....	..	14.89	0.459	29	14.71	0.069	01	15.11	0.290	*05*
5562.605	15.16	0.426	03	15.42	0.475	*07*	14.66	....	..	15.78	0.136	R	15.21	0.186	*23*	15.30	0.459	00
5563.594	15.16	0.400	*05*	14.99	0.169	11	*16.4*	....	..	15.37	0.197	00	15.37	0.235	*25*	14.99	0.229	*03*
5579.551	14.71	0.109	*22*	14.99	0.583	*13*	14.66	....	..	14.32	0.378	*114*	15.47	0.214	*10*	14.99	0.339	*24*
5581.558	14.71	0.085	*17*	14.27	0.647	07	15.21	....	..	15.11	0.065	34	15.73	0.341	*02*	15.21	0.518	*07*
5899.564	15.37	0.244	13	14.32	0.023	09	15.42	....	..	15.42	0.226	00	15.42	0.190	*05*	15.42	0.375	14
5901.555	15.04	0.204	*12*	14.71	0.071	34	15.42	....	..	15.42	0.361	*05*	15.83	0.301	10	14.89	0.538	*26*
" .646	15.47	0.295	17	14.89	0.162	03	15.42	....	..	14.27	0.452	*37*	15.83	0.392	19	14.32	0.019	*01*
6633.655	14.71	0.139	*28*	15.73	0.358	36	....	....	..	15.42	0.258	*02*	15.42	0.215	*15*	14.51	0.043	09
6634.509	15.16	0.475	33	15.22	0.565	*21*	14.99	....	..	15.42	0.184	09	15.22	0.130	04	15.32	0.287	17
" .566	14.89	0.034	08	14.27	0.622	00	1.527	....	..	15.42	0.241	*01*	15.73	0.187	28	15.42	0.344	18
" .682	14.99	0.150	*04*	14.71	0.090	27	....	....	..	14.99	0.357	*48*	15.42	0.303	*31*	15.22	0.460	*08*
7021.639	15.16	0.207	00	15.37	0.417	*06*	14.27	....	..	15.57	0.332	10	14.66	0.019	33	15.42	0.398	13
7023.629	14.89	0.166	*17*	15.51	0.464	03	14.99	....	..	14.71	0.002	11	15.22	0.129	05	14.51	0.559	*34*
" .678	15.16	0.215	*02*	15.73	0.513	23	15.22	....	..	14.79	0.051	08	15.42	0.178	00	14.32	0.608	00
8157.558	15.23	0.305	*07*	15.54	0.407	11	15.83	....	..	15.37	0.362	*10*	14.71	0.064	05	15.22	0.246	17
9533.816	14.99	0.072	13	15.73	0.468	24	15.73	....	..	15.73	0.376	27	15.83	0.303	10	14.99	0.298	*18*
" .888	15.22	0.144	20	15.83	0.540	34	15.83	....	..	14.99	0.448	24	16.10	0.375	40	14.99	0.370	*28*
" .914	15.47	0.170	39	15.73	0.566	30	15.37	....	..	14.71	0.009	11	15.83	0.401	26	15.22	0.396	*06*
" .947	15.22	0.203	06	14.99	0.599	26	15.73	....	..	14.79	0.042	10	14.71	0.434	05	14.99	0.429	*30*
9537.761	14.71	0.463	*22*	15.83	0.527	33	15.83	....	..	14.99	0.144	*22*	14.51	0.018	19	14.42	0.586	*05*
" .786	14.66	0.488	*16*	15.83	0.552	36	16.05	....	..	15.32	0.169	04	14.71	0.043	26	14.32	0.002	02
" .812	14.71	0.006	*09*	15.73	0.578	50	14.99	....	..	15.42	0.195	05	14.71	0.069	00	14.66	0.028	28
" .836	14.71	0.030	*09*	14.84	0.602	19	14.66	....	..	15.37	0.219	*05*	14.71	0.093	*22*	14.66	0.052	22
" .874	14.99	0.068	15	14.32	0.640	12	14.71	....	..	15.51	0.257	07	14.79	0.131	*39*	14.79	0.090	21
" .899	15.22	0.093	32	14.32	0.017	10	14.71	....	..	15.42	0.282	*05*	15.32	0.156	04	14.66	0.115	*02*
" .924	15.47	0.118	53	14.51	0.042	23	14.66	....	..	15.42	0.307	*05*	15.42	0.181	*01*	14.99	0.140	21
" .950	15.32	0.144	30	14.66	0.068	32	14.99	....	..	15.32	0.333	*15*	15.42	0.207	*12*	14.71	0.166	*13*

J. D.	No. 21. Per. 0d.604894			No. 22. Per. not det'd.			No. 23. Per. not det'd.			No. 24. Per. 0d.478377			No. 25. Per. not det'd.			No. 26. Per. 0d.622562		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
1145.794	....	....	..	....	....	..	....	....	..	....	....	..	13.83	....	..	14.66	0.274	*57*
1148.796	....	....	..	....	....	..	....	....	..	....	....	..	14.66	....	..	....	....	..
1155.796	....	....	..	....	....	..	....	....	..	....	....	..	14.66	....	..	....	....	..
1161.809	14.99	0.169	*08*	....	....	..	*15.3*	....	..	....	....	..	14.61	....	..	....	....	..
1174.794	....	....	..	....	....	..	....	....	..	14.66	0.025	17	14.17	....	..	14.56	0.014	19
1178.785	....	....	..	....	....	..	....	....	..	....	....	..	14.27	....	..	14.99	0.269	*23*
1199.701	14.66	0.558	*14*	....	....	..	....	....	..	14.61	0.057	*06*	14.27	....	..	14.17	0.018	*21*
3346.540	14.32	0.023	*24*	15.42	....	..	14.94	....	..	15.37	0.418	00	14.27	....	..	15.47	0.263	26
3366.544	14.61	0.065	*03*	15.73	....	..	14.89	....	..	15.37	0.330	*13*	14.22	....	..	15.42	0.345	09
3369.698	15.16	0.195	02	....	....	..	14.94	....	..	15.21	0.135	02	14.22	....	..	14.94	0.387	*42*
3370.528	15.47	0.420	00	16.15	....	..	15.11	....	..	14.27	0.009	*18*	14.32	....	..	14.32	0.594	*14*
3371.529	15.21	0.211	00	15.42	....	..	14.89	....	..	14.51	0.053	*13*	14.66	....	..	15.16	0.350	*18*
3374.502	14.99	0.160	*05*	15.47	....	..	14.89	....	..	15.21	0.156	*08*	14.56	....	..	14.99	0.210	*09*
" .538	15.11	0.196	*03*	....	....	..	14.94	....	..	15.26	0.192	*13*	14.66	....	..	14.99	0.246	*18*
3376.502	15.47	0.345	04	15.37	....	..	14.94	....	..	15.47	0.242	00	14.71	....	..	15.78	0.342	45
" .543	15.47	0.386	02	15.37	....	..	14.99	....	..	15.73	0.283	24	14.66	....	..	15.47	0.383	11
" .584	15.42	0.427	*05*	15.42	....	..	14.89	....	..	15.78	0.324	28	14.66	....	..	15.47	0.424	10
" .677	15.47	0.520	00	15.21	....	..	14.66	....	..	15.42	0.417	05	14.22	....	..	*15.6*	0.517	..
3377.578	15.37	0.211	16	15.37	....	..	14.99	....	..	15.47	0.361	*03*	14.61	....	..	15.11	0.173	15
3378.579	14.56	0.002	01	15.42	....	..	14.66	....	..	15.37	0.406	*06*	14.66	....	..	15.73	0.552	40
3380.500	14.89	0.109	01	15.47	....	..	14.89	....	..	15.73	0.413	33	14.56	....	..	14.51	0.605	15
" .602	14.89	0.211	*32*	15.47	....	..	14.89	....	..	14.89	0.037	35	14.89	....	..	14.56	0.084	*08*
3390.604	15.42	0.535	02	....	....	..	14.99	....	..	14.56	0.471	06	14.61	....	..	14.66	0.125	*16*
3408.568	15.47	0.352	04	15.42	....	..	14.89	....	..	15.47	0.257	*01*	14.56	....	..	14.66	0.035	20
3409.544	14.89	0.118	*01*	15.42	....	..	14.71	....	..	15.37	0.276	*12*	14.56	....	..	15.37	0.389	01
" .623	15.37	0.197	22	15.42	....	..	14.89	....	..	15.47	0.355	*02*	14.27	....	..	15.47	0.468	08
3411.603	15.37	0.362	*07*	15.37	....	..	14.76	....	..	15.73	0.422	38	14.61	....	..	14.89	0.580	00
3412.560	14.89	0.109	05	15.37	....	..	14.89	....	..	15.37	0.422	02	14.56	....	..	15.42	0.292	16
3413.569	15.73	0.514	26	15.37	....	..	14.94	....	..	14.51	0.474	03	14.56	....	..	14.66	0.056	12
3414.620	15.37	0.355	*07*	15.37	....	..	14.94	....	..	15.21	0.090	28	14.56	....	..	15.73	0.484	33
3415.489	14.56	0.014	00	15.78	....	..	14.99	....	..	14.22	0.002	*22*	14.66	....	..	14.89	0.108	15
" .531	14.61	0.056	*01*	15.42	....	..	14.99	....	..	14.27	0.044	*32*	14.56	....	..	14.89	0.150	*01*
" .572	14.89	0.097	11	15.47	....	..	14.94	....	..	14.61	0.085	*27*	14.71	....	..	15.11	0.191	*08*
" .614	14.99	0.139	02	15.73	....	..	14.99	....	..	15.21	0.127	07	14.66	....	..	15.73	0.233	R
3419.548	15.47	0.444	00	15.83	....	..	14.89	....	..	15.16	0.234	*31*	14.56	....	..	14.89	0.432	*48*
3422.494	15.42	0.365	*02*	....	....	..	14.89	....	..	15.04	0.310	*45*	14.22	....	..	14.89	0.265	*32*
" .591	....	....	..	....	....	..	14.94	....	..	14.99	0.407	*44*	14.27	....	..	15.21	0.362	*13*
3423.506	15.11	0.167	06	15.78	....	..	14.89	....	..	15.16	0.365	*33*	14.22	....	..	14.27	0.032	*16*
3666.649	15.08	0.143	09	15.73	....	..	14.99	....	..	14.89	0.014	42	14.61	....	..	15.16	0.375	*18*
3673.681	15.47	0.521	00	15.27	....	..	14.79	....	..	15.47	0.349	*03*	14.27	....	..	14.76	0.559	*52*
3693.638	*15.3*	0.517	..	14.63	....	..	15.05	....	..	15.21	0.214	*23*	14.56	....	..	14.27	0.594	*18*
3694.577	15.21	0.246	*07*	15.78	....	..	14.94	....	..	15.11	0.196	*29*	14.73	....	..	15.21	0.288	*03*
" .615	15.37	0.284	01	15.93	....	..	14.99	....	..	15.42	0.234	*04*	14.66	....	..	15.78	0.326	47
3695.519	14.94	0.583	38	15.30	....	..	15.05	....	..	15.21	0.182	*16*	14.61	....	..	14.17	0.608	*17*
" .561	14.51	0.020	*05*	15.73	....	..	14.94	....	..	15.37	0.224	*08*	14.76	....	..	14.56	0.027	14
" .602	14.89	0.061	24	15.78	....	..	14.99	....	..	16.15	0.265	66	14.71	....	..	14.61	0.068	00
" .644	14.89	0.103	07	15.83	....	..	14.89	....	..	16.15	0.307	R	14.66	....	..	14.61	0.110	*14*
3698.504	15.05	0.543	*25*	15.37	....	..	14.94	....	..	14.94	0.296	*55*	14.61	....	..	14.94	0.480	*46*
3699.499	15.37	0.329	*03*	15.16	....	..	15.05	....	..	15.30	0.335	*20*	14.56	....	..	14.89	0.230	*24*
" .542	15.27	0.372	*18*	15.57	....	..	14.94	....	..	15.93	0.378	45	14.51	....	..	15.61	0.273	38

J. D.	No. 21.	Per. o^d.604894		No. 22.	Per. not det'd.		No. 25.	Per. not det'd.		No. 24.	Per. o^d.478377		No. 25.	Per. not det'd.		No. 26.	Per. o^d.622562	
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
3699.584	15.42	0.414	*04*	15.42	....	..	14.94	....	..	15.78	0.420	41	14.61	....	..	15.30	0.315	00
3713.513	15.37	0.430	*10*	15.57	....	..	14.99	....	..	14.56	0.476	10	14.61	....	..	15.27	0.547	*09*
" .680	14.56	0.597	01	15.61	....	..	14.99	....	..	15.21	0.164	*11*	14.56	....	..	14.94	0.092	25
3717.517	15.30	0.200	13	15.42	....	..	14.94	....	..	14.17	0.174	R	14.66	....	..	14.89	0.193	*14*
" .692	15.57	0.375	12	15.78	....	..	15.11	....	..	15.37	0.349	*13*	14.27	....	..	14.89	0.368	*45*
" .817	15.68	0.500	21	15.42	....	..	15.16	....	..	14.61	0.474	15	14.42	....	..	14.66	0.493	R
3724.535	14.99	0.564	29	15.42	....	..	15.05	....	..	14.27	0.017	*20*	14.66	....	..	15.27	0.363	*08*
" .676	14.89	0.100	09	15.47	....	..	15.11	....	..	15.21	0.158	*08*	14.61	....	..	14.99	0.504	*41*
3748.572	15.47	0.405	01	*15.4*	....	..	15.16	....	..	15.11	0.135	*08*	14.61	....	..	14.66	0.120	*13*
3775.556	15.21	0.169	14	15.96	....	..	15.01	....	..	15.11	0.330	*39*	14.17	....	..	15.78	0.334	46
3960.869	15.42	0.384	*03*	*15.6*	....	..	15.04	....	..	14.51	0.033	*02*	14.32	....	..	14.99	0.124	18
4014.745	15.37	0.425	*10*	15.32	....	..	15.04	....	..	....	....	..	14.71	....	..	....	....	..
4037.635	15.42	0.329	02	15.37	....	..	14.99	....	..	15.27	0.258	*21*	14.51	....	..	14.89	0.315	*41*
" .663	*15.1*	0.357	..	*15.1*	....	..	14.94	....	..	*15.1*	0.286	..	14.42	....	..	15.37	0.343	04
4041.675	14.89	0.135	*07*	15.73	....	..	14.94	....	..	14.51	0.471	00	14.51	....	..	14.51	0.619	18
4052.600	15.26	0.172	18	15.47	....	..	15.06	....	..	15.26	0.393	*20*	14.04	....	..	15.26	0.338	*07*
4058.548	14.56	0.071	*12*	15.37	....	..	14.99	....	..	15.26	0.123	13	14.66	....	..	14.56	0.060	00
" .662	15.06	0.185	*06*	15.58	....	..	14.94	....	..	15.83	0.237	36	14.40	....	..	15.06	0.174	09
" .780	15.21	0.303	*17*	15.37	....	..	15.06	....	..	15.98	0.355	48	14.22	....	..	15.37	0.292	12
" .854	15.26	0.377	*19*	15.26	....	..	15.06	....	..	15.37	0.429	08	14.40	....	..	15.58	0.366	24
4066.635	15.26	0.294	*11*	15.58	....	..	14.99	....	..	14.66	0.077	*14*	14.61	....	..	14.40	0.054	*14*
4067.636	14.82	0.085	09	15.73	....	..	15.06	....	..	15.06	0.121	*07*	14.40	....	..	15.26	0.433	*12*
4069.560	15.26	0.195	11	15.47	....	..	15.06	....	..	15.06	0.132	*10*	14.56	....	..	15.26	0.489	*14*
" .795	15.37	0.430	*10*	15.58	....	..	14.89	....	..	15.47	0.367	*02*	14.56	....	..	14.66	0.101	*06*
4070.655	14.66	0.080	*06*	15.58	....	..	15.06	....	..	15.37	0.270	*12*	14.56	....	..	15.26	0.339	*07*
4071.538	15.37	0.358	*06*	15.58	....	..	15.06	....	..	15.06	0.196	*34*	14.27	....	..	14.40	0.599	00
" .747	14.89	0.567	24	15.58	....	..	15.06	....	..	15.26	0.405	*18*	14.56	....	..	14.99	0.186	*02*
4072.538	14.99	0.148	*02*	15.58	....	..	14.99	....	..	15.26	0.240	*21*	14.40	....	..	....	....	..
" .745	15.26	0.355	*17*	15.47	....	..	14.99	....	..	14.82	0.447	*04*	14.40	....	..	15.26	0.561	*01*
4073.553	15.06	0.558	21	15.58	....	..	14.89	....	..	15.58	0.298	09	14.27	....	..	14.82	0.124	01
" .758	14.99	0.158	*05*	15.58	....	..	14.99	....	..	14.27	0.025	*23*	14.56	....	..	15.21	0.329	*10*
4074.561	15.37	0.356	*07*	15.58	....	..	15.06	....	..	15.21	0.349	*29*	14.27	....	..	15.26	0.509	*14*
4085.663	14.66	0.570	03	15.47	....	..	15.06	....	..	14.99	0.448	14	14.27	....	..	15.47	0.405	10
4086.608	15.26	0.306	*12*	15.37	....	..	14.99	....	..	15.58	0.437	45	14.22	....	..	14.82	0.105	09
4092.573	15.21	0.222	*02*	15.26	....	..	14.89	....	..	15.26	0.183	*11*	14.40	....	..	15.26	0.467	*13*
4093.532	14.66	0.576	06	15.26	....	..	15.06	....	..	15.06	0.185	*31*	14.40	....	..	14.82	0.181	*20*
" .762	15.06	0.201	*11*	15.26	....	..	14.94	....	..	....	....	..	14.40	....	..	....	....	..
4133.607	14.89	0.123	*03*	15.21	....	..	15.11	....	..	14.84	0.076	04	14.66	....	..	15.16	0.412	*21*
4147.519	14.76	0.122	*16*	15.37	....	..	14.76	....	..	15.37	0.115	29	14.12	....	..	14.66	0.005	32
4437.629	15.47	0.488	00	15.47	....	..	14.89	....	..	15.09	0.329	*41*	14.56	....	..	14.17	0.001	*17*
4795.632	15.37	0.394	*09*	15.16	....	..	14.94	....	..	14.56	0.028	05	14.27	....	..	14.56	0.031	13
4846.568	15.78	0.519	31	15.47	....	..	15.11	....	..	15.73	0.256	24	14.56	....	..	15.73	0.539	35
4860.582	14.51	0.015	*05*	15.37	....	..	14.94	....	..	15.78	0.397	33	14.32	....	..	15.21	0.235	07
4876.513	15.11	0.219	*10*	15.78	....	..	15.11	....	..	14.66	0.063	*05*	14.56	....	..	14.37	0.601	00
4886.535	14.99	0.563	29	15.42	....	..	14.89	....	..	14.89	0.039	34	14.66	....	..	14.66	0.040	19
5560.608	14.94	0.179	*16*	15.47	....	..	14.99	....	..	14.99	0.079	16	14.56	....	..	....	....	..
5562.605	15.37	0.361	*07*	15.21	....	..	14.89	....	..	15.78	0.162	47	14.56	....	..	14.27	0.008	*08*
5563.594	14.66	0.140	*32*	15.37	....	..	14.89	....	..	16.15	0.195	75	14.61	....	..	15.93	0.374	58
5579.551	15.47	0.370	03	15.47	....	..	14.99	....	..	15.47	0.365	*02*	14.56	....	..	14.89	0.144	01
5581.558	14.89	0.562	19	15.61	....	..	14.99	....	..	14.56	0.459	*08*	14.51	....	..	15.42	0.284	18

J. D.	No. 21. Per. 0d.604894			No. 22. Per. not det'd.			No. 23. Per. not det'd.			No. 24. Per. 0d.478377			No. 25. Per. not det'd.			No. 26. Per. 0d.622562		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
5899.564	15.42	0.394	*04*	15.42	....	..	14.99	....	..	15.42	0.344	*08*	14.51	....	..	14.99	0.161	05
5901.555	14.71	0.571	10	15.42	....	..	14.89	....	..	15.42	0.421	07	14.42	....	..	15.04	0.284	*20*
" .646	14.66	0.057	04	15.42	....	..	14.99	....	..	14.66	0.034	11	14.51	....	..	15.42	0.375	07
6633.655	14.89	0.144	*10*	15.22	....	..	14.89	....	..	15.27	0.126	13	14.71	....	..	....	....	..
6634.509	15.42	0.393	*04*	15.42	....	..	14.99	....	..	14.51	0.023	01	14.51	....	..	15.42	0.482	02
" .566	15.42	0.450	*05*	15.73	....	..	14.99	....	..	14.89	0.080	05	14.71	....	..	15.42	0.539	04
" .682	14.61	0.566	*07*	15.37	....	..	14.99	....	..	15.27	0.196	*13*	14.71	....	..	14.56	0.033	13
7021.639	15.73	0.391	28	15.73	....	..	14.99	....	..	14.99	0.146	*24*	14.12	....	..	15.42	0.379	07
7023.629	14.71	0.566	03	15.42	....	..	14.89	....	..	15.42	0.223	*02*	13.93	....	..	15.42	0.501	02
" .678	14.71	0.010	16	15.42	....	..	15.22	....	..	15.73	0.272	24	14.12	....	..	14.89	0.550	*45*
8157.558	15.37	0.319	*03*	15.37	....	..	14.89	....	..	15.37	0.398	*08*	14.66	....	..	14.89	0.122	09
9533.816	15.57	0.443	10	15.32	....	..	14.89	....	..	15.83	0.366	34	14.17	....	..	15.73	0.518	33
" .888	15.83	0.515	36	15.37	....	..	14.79	....	..	14.99	0.438	*09*	14.27	....	..	14.99	0.590	46
" .914	15.42	0.541	07	....	....	..	14.99	....	..	14.66	0.464	08	14.27	....	..	14.61	0.616	27
" .947	14.32	0.574	*28*	15.37	....	..	14.71	....	..	14.66	0.018	18	14.27	....	..	14.61	0.027	19
9537.761	14.89	0.154	*14*	15.22	....	..	14.99	....	..	14.71	0.005	27	14.66	....	..	14.71	0.105	*02*
" .786	14.99	0.179	*11*	15.22	....	..	14.89	....	..	14.79	0.030	27	14.61	....	..	14.89	0.130	06
" .812	15.29	0.205	11	15.42	....	..	14.99	....	..	14.99	0.056	32	14.66	....	..	14.89	0.156	*03*
" .836	14.99	0.229	*25*	15.32	....	..	14.99	....	..	14.99	0.080	15	14.56	....	..	14.99	0.180	00
" .874	15.62	0.267	30	15.54	....	..	14.99	....	..	15.15	0.118	06	14.42	....	..	14.99	0.218	*11*
" .899	15.42	0.292	06	15.32	....	..	14.89	....	..	15.37	0.143	14	14.32	....	..	15.37	0.243	21
" .924	15.42	0.317	03	15.42	....	..	14.99	....	..	15.42	0.168	09	14.32	....	..	15.42	0.268	20
" .950	15.73	0.343	31	15.22	....	..	14.79	....	..	15.42	0.194	02	14.32	....	..	15.42	0.294	16

J. D.	No. 27. Per. 0d.470328			No. 28. Per. 0d.543948			No. 29. Per. 0d.451435			No. 30. Per. 0d.592177			No. 31. Per. 0d.461937			No. 32. Per. 0d.457787		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
1145.794	....	....	..	14.61	0.508	*29*	14.61	0.024	06	....	....	..	....	....	..	....	....	..
1148.796	14.56	0.096	*13*	....	....	..	....	....	..	14.71	0.327	*66*	14.66	0.021	*02*	14.27	0.454	12
1155.796	14.66	0.041	13	....	....	..	....	....	..	....	....	..	14.66	0.092	*46*	....	....	..
1161.809	14.61	0.410	*81*	....	....	..	....	....	..	....	....	..	14.94	0.100	*23*	14.99	0.191	*44*
1174.794	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
1178.785	14.27	0.454	*33*	....	....	..	....	....	..	....	....	..	14.94	0.446	17	....	....	..
1199.701	14.66	0.206	*65*	14.27	0.020	*23*	....	....	..	14.94	0.305	*40*	14.94	0.113	*34*	15.21	0.087	29
3346.540	15.73	0.468	125	15.37	0.440	*35*	14.27	0.024	*28*	15.47	0.502	*03*	15.37	0.331	11	15.47	0.362	*12*
3366.544	15.37	0.247	*13*	15.73	0.318	09	15.42	0.165	19	15.37	0.372	*07*	14.56	0.009	*10*	15.73	0.224	21
3369.698	14.66	0.109	*08*	15.47	0.209	13	....	....	..	14.94	0.565	01	....	....	..	....	....	..
3370.528	14.32	0.469	*16*	15.42	0.495	00	15.11	0.086	23	15.47	0.211	31	15.16	0.298	34	14.99	0.088	07
3371.529	14.27	0.059	*29*	15.47	0.408	*24*	15.37	0.184	07	14.56	0.028	*07*	15.37	0.375	00	15.37	0.173	00
3374.502	15.37	0.210	01	14.89	0.117	*04*	14.51	0.449	01	14.61	0.040	*04*	15.37	0.115	08	15.37	0.399	*07*
" .538	15.21	0.246	*29*	15.47	0.153	35	14.56	0.033	*01*	14.99	0.076	25	....	....	..	14.17	0.435	*18*
3376.502	16.10	0.329	52	15.73	0.485	09	15.42	0.192	10	15.42	0.263	15	14.94	0.267	22	14.94	0.110	*13*
" .543	15.73	0.370	20	14.61	0.526	02	15.37	0.233	*04*	15.47	0.304	13	14.99	0.308	00	15.16	0.151	*11*
" .584	15.73	0.411	33	14.61	0.023	10	15.42	0.274	*04*	15.37	0.345	*02*	15.21	0.349	*13*	15.47	0.192	03
" .677	15.16	0.033	R	15.11	0.116	17	15.11	0.367	*33*	15.47	0.438	*02*	15.16	0.442	38	15.47	0.285	*11*
3377.578	14.99	0.464	48	15.73	0.473	04	14.89	0.365	*55*	14.89	0.155	*10*	15.16	0.419	11	15.37	0.271	*21*
3378.579	14.56	0.054	01	15.37	0.386	*33*	14.56	0.011	04	14.99	0.564	04	14.89	0.034	17	15.37	0.356	*22*
3380.500	14.89	0.094	21	14.89	0.132	*13*	15.37	0.127	25	14.89	0.116	02	15.37	0.107	14	14.22	0.446	05
" .602	15.37	0.196	10	15.47	0.234	04	15.37	0.229	*02*	15.37	0.218	20	14.89	0.209	*08*	14.66	0.090	*27*
3390.604	15.11	0.321	*47*	15.83	0.445	11	15.83	0.299	35	14.99	0.153	01	14.89	0.049	14	14.27	0.021	*05*

J. D.	No. 27. Per. 0d.470328			No. 28. Per. 0d.543948			No. 29. Per. 0d.451435			No. 30. Per. 0d.592177			No. 31. Per. 0d.461937			No. 32. Per. 0d.457787		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
3408.568	15.73	0.412	33	15.73	0.458	02	15.37	0.206	02	15.37	0.352	*04*	14.89	0.459	20	15.11	0.131	*09*
3409.544	15.78	0.448	88	15.47	0.346	*22*	15.37	0.279	*10*	14.71	0.143	*25*	14.66	0.049	*12*	15.37	0.192	*06*
" .623	14.66	0.056	10	15.37	0.425	*35*	14.89	0.358	*57*	15.37	0.222	18	14.89	0.128	*42*	15.47	0.271	*10*
3411.603	15.73	0.155	R	15.42	0.230	00	14.66	0.081	*20*	15.37	0.426	*10*	14.61	0.261	*11*	15.42	0.420	42
3412.560	15.40	0.171	27	14.89	0.099	04	15.16	0.135	03	15.11	0.198	*01*	14.66	0.294	*15*	14.22	0.003	04
3413.569	15.73	0.240	26	14.27	0.020	*23*	15.37	0.241	*05*	14.56	0.023	*07*	15.37	0.379	00	14.99	0.097	01
3414.620	15.78	0.350	20	14.61	0.527	08	14.56	0.389	*80*	15.47	0.482	*03*	14.66	0.044	*10*	15.47	0.232	*06*
3415.489	15.73	0.278	19	15.47	0.308	*16*	14.94	0.355	*53*	15.11	0.166	09	14.89	0.451	17	15.47	0.186	06
" .531	15.47	0.320	*11*	15.73	0.350	04	14.66	0.397	*61*	15.37	0.208	23	14.89	0.031	18	15.73	0.228	20
" .572	15.47	0.361	*11*	15.83	0.391	12	14.32	0.438	*19*	15.37	0.249	13	14.89	0.072	*03*	15.78	0.269	21
" .614	15.73	0.403	26	15.83	0.433	11	14.61	0.029	04	15.73	0.291	40	15.11	0.114	*16*	15.73	0.311	13
3419.548	14.27	0.104	*46*	14.56	0.015	09	15.11	0.351	*36*	14.56	0.080	*20*	15.21	0.353	*16*	14.94	0.124	*20*
3422.494	14.99	0.228	*44*	15.21	0.242	*25*	15.21	0.137	07	14.66	0.065	*06*	14.89	0.065	02	....	....	..
" .591	15.47	0.325	*11*	15.36	0.339	*32*	....	....	..	14.66	0.162	*35*	15.42	0.162	09	14.99	0.421	00
3423.506	15.26	0.300	*31*	15.11	0.166	*06*	15.73	0.246	30	15.42	0.485	*08*	15.42	0.153	09	14.99	0.420	*01*
3666.649	14.94	0.283	R	14.89	0.163	*28*	14.89	0.066	13	15.16	0.243	*08*	15.78	0.317	64	14.39	0.020	09
3673.681	15.47	0.260	*06*	15.11	0.125	13	15.27	0.326	*22*	15.11	0.169	08	14.56	0.420	*49*	15.73	0.186	31
3693.638	14.66	0.464	15	15.21	0.500	00	14.66	0.420	04	14.66	0.584	03	14.66	0.052	*13*	14.17	0.000	01
3694.577	14.89	0.462	38	15.11	0.351	*58*	14.56	0.005	06	15.78	0.339	39	15.11	0.067	23	14.27	0.023	*05*
" .615	14.56	0.030	05	15.93	0.389	22	14.66	0.043	02	15.61	0.377	15	15.61	0.105	38	14.51	0.061	*19*
3695.519	14.94	0.463	43	15.11	0.205	*22*	14.94	0.044	30	14.94	0.097	13	15.27	0.085	25	14.66	0.050	08
" .561	14.66	0.035	14	15.73	0.247	25	15.05	0.086	16	14.94	0.139	00	15.33	0.127	02	14.94	0.092	*61*
" .602	14.89	0.076	27	15.96	0.288	38	15.08	0.127	*02*	15.05	0.180	*02*	15.21	0.168	*10*	15.30	0.133	09
" .644	14.66	0.118	*14*	15.83	0.330	16	15.21	0.169	*03*	15.33	0.222	14	14.66	0.210	*31*	15.57	0.175	20
3698.504	15.16	0.156	13	14.89	0.470	*80*	15.37	0.321	*12*	14.99	0.121	10	15.37	0.299	55	15.42	0.288	*16*
3699.499	15.37	0.210	02	15.42	0.377	*28*	14.94	0.413	24	15.05	0.524	*43*	15.30	0.370	*08*	15.21	0.368	*37*
" .542	15.78	0.253	26	15.96	0.420	24	14.56	0.004	06	14.94	0.567	04	14.79	0.413	*37*	15.08	0.411	*14*
" .584	15.73	0.295	16	15.93	0.462	22	14.66	0.046	02	14.66	0.017	04	14.79	0.455	08	14.12	0.453	*03*
3713.513	14.73	0.114	*04*	15.42	0.248	*05*	14.79	0.432	26	15.37	0.325	00	15.30	0.064	45	15.42	0.190	*01*
" .680	15.11	0.281	*44*	15.73	0.415	01	15.30	0.148	13	15.57	0.492	07	15.01	0.231	21	15.47	0.357	*12*
3717.517	14.89	0.356	*69*	15.05	0.445	*67*	15.37	0.373	*05*	15.11	0.184	02	15.61	0.372	23	14.89	0.074	07
" .692	14.56	0.060	00	14.76	0.076	04	15.21	0.097	26	15.61	0.359	20	15.21	0.085	19	15.61	0.249	06
" .817	14.56	0.185	R	15.16	0.201	*17*	15.42	0.222	04	14.66	0.484	16	15.52	0.210	55	*15.6*	0.374	..
3724.535	15.47	0.319	*11*	15.47	0.391	*24*	15.30	0.168	07	14.94	0.096	13	14.73	0.461	05	15.47	0.225	*06*
" .676	15.11	0.460	57	14.66	0.532	14	15.57	0.309	08	15.11	0.237	*11*	15.11	0.140	*22*	15.83	0.366	24
3748.572	15.11	0.369	*46*	15.46	0.495	01	*15.4*	0.279	..	16.08	0.446	59	14.73	0.016	07	14.17	0.457	02
3775.556	14.39	0.074	*23*	15.93	0.281	36	15.42	0.177	15	15.27	0.190	17	15.11	0.207	11	14.27	0.432	*13*
3960.869	14.66	0.078	04	14.89	0.108	00	15.04	0.402	*16*	15.27	0.151	29	15.27	0.283	54	15.37	0.341	*23*
4014.745	....	....	..	15.05	0.133	02	14.99	0.106	*01*	14.99	0.139	05	15.21	0.113	*05*	15.42	0.198	*02*
4037.635	14.89	0.180	*28*	15.37	0.177	14	14.71	0.424	14	15.68	0.527	21	15.42	0.368	04	15.42	0.199	*03*
" .663	15.42	0.208	09	15.42	0.205	08	14.51	0.000	01	15.26	0.555	18	14.71	0.396	*61*	14.71	0.227	18
4041.675	14.89	0.458	32	15.83	0.410	12	15.27	0.401	06	15.42	0.421	*06*	14.76	0.251	04	14.99	0.119	*14*
4052.600	14.56	0.095	*12*	15.58	0.456	*13*	14.56	0.040	*06*	14.66	0.095	*15*	15.26	0.089	19	14.40	0.057	*25*
4058.548	15.58	0.399	09	15.58	0.420	*14*	14.99	0.119	*08*	14.56	0.121	*33*	14.82	0.032	11	14.40	0.054	*24*
" .662	14.56	0.043	03	14.40	0.534	*10*	15.37	0.233	*03*	15.06	0.235	*16*	15.11	0.146	*22*	15.11	0.168	*23*
" .780	15.11	0.161	05	14.66	0.108	*24*	15.47	0.351	00	15.26	0.353	*15*	14.66	0.264	*06*	15.37	0.286	*21*
" .854	15.26	0.235	*20*	15.06	0.182	*20*	14.89	0.425	33	15.37	0.427	*11*	14.99	0.338	*32*	15.26	0.360	*34*
4066.635	14.82	0.020	33	15.58	0.348	*11*	14.66	0.081	*21*	15.58	0.510	08	14.66	0.266	*06*	15.58	0.358	*02*
4067.636	14.27	0.080	*36*	15.58	0.261	06	15.37	0.179	10	15.26	0.327	*11*	15.26	0.343	*08*	14.04	0.444	*14*
4069.560	14.56	0.123	*27*	14.40	0.010	*06*	15.58	0.297	09	15.58	0.474	08	14.66	0.419	*40*	14.66	0.079	*18*

J. D.	No. 27. Per. $0^d.470328$			No. 28. Per. $0^d.543948$			No. 29. Per. $0^d.451435$			No. 30. Per. $0^d.592177$			No. 31. Per. $0^d.461937$			No. 32. Per. $0^d.457787$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
4069.795	15.58	0.358	01	15.58	0.244	12	14.82	0.081	04	14.66	0.117	21	15.37	0.192	23	15.58	0.314	02
4070.655	15.26	0.277	29	14.40	0.017	09	14.56	0.038	05	15.37	0.385	08	15.26	0.128	06	15.58	0.258	01
4071.538	14.99	0.220	41	15.58	0.356	11	14.40	0.018	13	14.82	0.083	05	15.26	0.088	22	15.58	0.226	06
" .747	15.58	0.429	32	14.40	0.021	11	15.47	0.227	07	15.26	0.292	07	14.82	0.297	02	14.27	0.435	08
4072.538	15.26	0.279	29	15.58	0.268	05	15.06	0.115	02	15.58	0.491	08	14.99	0.164	32	15.58	0.310	02
" .745	14.82	0.016	33	15.47	0.475	21	15.58	0.322	09	14.82	0.106	01	15.26	0.371	12	14.56	0.059	12
4073.553	15.58	0.353	00	15.21	0.195	10	15.58	0.227	19	15.58	0.322	21	14.82	0.255	10	15.26	0.410	02
" .758	14.17	0.088	48	15.47	0.400	24	14.89	0.432	37	15.58	0.527	09	14.82	0.460	13	15.26	0.157	05
4074.561	15.26	0.421	07	14.82	0.115	11	15.58	0.332	09	15.06	0.145	10	15.37	0.339	05	14.56	0.044	00
4085.663	15.26	0.235	21	15.26	0.338	42	15.06	0.148	11	14.56	0.588	07	15.11	0.354	25	15.11	0.159	20
4086.608	15.58	0.239	11	15.26	0.195	05	15.37	0.190	06	15.37	0.349	04	15.26	0.376	12	15.26	0.189	16
4092.573	14.40	0.090	28	15.11	0.177	12	15.58	0.287	11	15.37	0.392	09	15.26	0.335	02	15.37	0.203	10
4093.532	14.56	0.108	17	14.40	0.048	21	15.58	0.343	09	15.26	0.167	24	15.26	0.371	12	15.58	0.246	04
" .762	....	....	..	15.06	0.278	50	15.06	0.121	03	15.26	0.397	20	15.06	0.139	27	14.04	0.018	24
4133.607	14.99	0.206	33	15.78	0.415	07	15.16	0.240	27	15.16	0.566	23	14.66	0.257	07	14.56	0.036	09
4147.519	15.47	0.008	99	14.99	0.184	27	14.89	0.158	32	14.99	0.266	28	14.89	0.311	16	15.47	0.214	04
4437.629	15.42	0.396	09	15.42	0.370	28	14.99	0.446	49	15.42	0.209	28	15.21	0.324	01	15.01	0.087	11
4795.632	....	....	..	15.78	0.455	07	14.56	0.010	05	15.27	0.537	18	15.37	0.326	14	15.37	0.101	36
4846.568	14.99	0.149	00	15.42	0.260	10	15.47	0.385	10	15.21	0.546	13	14.94	0.449	21	15.47	0.222	04
4860.582	14.61	0.053	06	14.99	0.131	02	15.37	0.405	30	15.27	0.348	13	15.37	0.143	04	14.61	0.045	04
4876.513	15.47	0.464	96	15.37	0.288	22	14.56	0.084	32	15.42	0.290	09	15.47	0.368	09	15.21	0.411	02
4886.535	14.99	0.138	08	14.89	0.519	26	14.99	0.175	28	15.42	0.245	19	14.66	0.228	15	15.78	0.362	19
5560.608	15.47	0.231	01	14.89	0.096	05	15.37	0.255	07	15.30	0.420	17	15.42	0.335	12	15.16	0.115	04
5562.605	15.42	0.347	16	15.37	0.461	34	14.94	0.446	44	14.89	0.049	23	14.66	0.022	02	15.73	0.281	15
5563.594	15.47	0.395	03	15.37	0.362	33	14.56	0.081	31	15.47	0.445	02	14.99	0.087	03	15.47	0.354	12
5579.551	15.42	0.361	16	14.56	0.001	11	15.37	0.238	05	15.42	0.414	05	15.21	0.338	10	15.47	0.288	12
5581.558	15.21	0.017	72	15.47	0.376	24	15.11	0.439	60	14.71	0.052	01	14.66	0.036	06	14.27	0.006	08
5899.564	14.51	0.081	13	15.42	0.172	20	15.22	0.183	08	14.71	0.059	01	14.71	0.229	10	15.73	0.308	13
5901.555	14.99	0.191	25	14.71	0.532	19	15.42	0.369	01	15.42	0.273	13	15.42	0.372	04	14.27	0.010	04
" .646	15.42	0.282	13	14.71	0.079	03	14.37	0.008	14	15.57	0.364	15	14.71	0.001	05	15.22	0.101	21
6633.655	....	....	..	15.99	0.478	32	15.37	0.241	06	15.54	0.443	04	14.79	0.302	11	15.22	0.109	15
6634.509	15.42	0.374	14	15.73	0.244	27	15.42	0.192	10	14.99	0.112	14	14.99	0.232	21	14.71	0.047	15
" .566	15.73	0.431	51	15.73	0.301	12	15.73	0.249	30	14.99	0.169	04	15.27	0.289	51	15.12	0.104	09
" .682	14.42	0.076	19	15.57	0.417	15	15.32	0.365	13	15.37	0.285	06	15.12	0.405	11	15.37	0.220	14
7021.639	....	....	..	14.89	0.083	12	14.89	0.442	39	15.22	0.551	02	14.76	0.259	03	15.83	0.347	23
7023.629	14.51	0.062	06	15.83	0.441	11	15.27	0.175	00	14.89	0.172	15	15.42	0.401	15	14.66	0.048	08
" .678	14.71	0.111	03	15.83	0.490	20	15.42	0.224	03	15.42	0.221	23	14.89	0.450	17	15.15	0.097	17
8157.558	14.32	0.030	19	15.73	0.238	28	14.71	0.100	26	14.79	0.082	02	14.71	0.275	01	14.71	0.039	21
9533.816	15.73	0.108	100	15.83	0.308	20	15.42	0.384	05	14.99	0.121	10	14.89	0.423	13	....	....	..
" .888	15.83	0.180	65	15.83	0.380	13	14.45	0.004	05	15.37	0.193	27	14.71	0.033	00	15.57	0.261	00
" .914	15.73	0.206	40	15.73	0.406	01	....	....	..	15.42	0.219	24	14.79	0.059	02	15.73	0.287	14
" .947	15.83	0.239	36	15.83	0.439	11	14.32	0.063	42	15.37	0.252	11	14.71	0.092	39	15.42	0.320	18
9537.761	15.83	0.291	26	15.83	0.445	11	15.32	0.266	13	15.73	0.513	23	14.71	0.210	24	14.56	0.014	29
" .786	15.73	0.316	16	15.83	0.470	13	15.15	0.291	33	15.15	0.538	29	14.71	0.235	06	14.71	0.039	21
" .812	15.83	0.342	25	15.73	0.496	28	15.27	0.317	22	14.99	0.564	05	14.79	0.261	07	14.71	0.065	01
" .836	15.96	0.366	39	14.79	0.520	16	15.37	0.341	11	14.71	0.588	10	14.89	0.285	16	14.89	0.089	04
" .874	15.83	0.404	37	14.61	0.014	14	15.37	0.379	03	14.71	0.033	07	14.71	0.323	50	15.12	0.127	05
" .899	14.99	0.429	27	14.66	0.039	11	14.89	0.404	21	14.66	0.058	04	15.22	0.348	12	15.32	0.152	03
" .924	14.71	0.454	08	14.89	0.064	21	14.99	0.429	45	14.79	0.083	02	15.42	0.373	04	15.42	0.177	03
" .950	14.66	0.009	17	14.89	0.090	07	14.66	0.003	16	14.79	0.109	04	15.42	0.399	13	15.83	0.203	36

J. D.	No. 33. Per. 0d.501472			No. 34. Per. 0d.568140			No. 35. Per. 0d.616770			No. 36. Per. not det'd.			No. 37. Per. 0d.488704			No. 38. Per. 0d.470439		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
1145.794	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
1148.796	....	....	..	....	....	..	14.66	0.399	*34*	....	....	..	....	....	..	14.66	0.036	18
1155.796	....	....	..	14.61	0.564	20	....	....	..	....	....	..	....	....	..	14.66	0.450	*03*
1161.809	....	....	..	....	....	..	14.99	0.460	*23*	....	....	..	....	....	..	....	....	..
1174.794	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
1178.785	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
1199.701	....	....	..	....	....	..	14.94	0.112	*19*	14.66	....	..	....	....	..	....	....	..
3346.540	15.37	0.160	03	14.27	0.560	*14*	14.61	0.592	*05*	14.94	....	..	*16.5*	0.381	..	15.78	0.359	27
3366.544	15.11	0.105	08	14.66	0.111	*23*	14.89	0.242	09	14.66	....	..	15.73	0.344	*02*	15.11	0.135	05
3369.698	15.04	0.250	*60*	15.47	0.425	00	14.66	0.313	*01*	14.66	....	..	14.66	0.076	*03*	14.27	0.466	*10*
3370.528	14.89	0.077	03	15.16	0.118	25	15.11	0.526	08	14.17	....	..	15.57	0.418	*16*	15.73	0.355	22
3371.529	14.89	0.075	04	14.27	0.551	*13*	14.61	0.293	*06*	14.66	....	..	15.11	0.441	*46*	15.73	0.415	30
3374.502	14.61	0.040	03	14.89	0.115	*01*	14.89	0.182	*32*	14.89	....	..	....	....	..	14.89	0.095	03
" .538	14.66	0.076	*19*	14.99	0.151	*01*	14.61	0.218	*35*	14.66	....	..	14.27	0.029	*03*	14.94	0.131	*09*
3376.502	14.66	0.034	12	15.47	0.411	*01*	14.66	0.332	*02*	14.99	....	..	14.27	0.037	*10*	15.47	0.213	13
" .543	14.94	0.075	09	15.44	0.452	01	14.84	0.373	01	14.99	....	..	14.56	0.078	*14*	15.47	0.254	01
" .584	15.21	0.116	10	15.29	0.493	15	15.11	0.414	02	15.11	....	..	15.21	0.119	11	15.73	0.295	24
" .677	15.42	0.209	*10*	14.58	0.018	09	15.16	0.507	03	15.21	....	..	15.42	0.212	*15*	15.11	0.388	*39*
3377.578	15.16	0.107	11	15.37	0.351	*09*	14.99	0.174	*24*	14.71	....	..	15.21	0.136	00	15.78	0.348	27
3378.579	14.94	0.105	*10*	15.42	0.215	23	14.89	0.559	08	14.89	....	..	15.37	0.159	01	15.78	0.409	33
3380.500	14.46	0.020	03	15.47	0.432	00	14.56	0.013	*08*	14.66	....	..	....	....	..	14.89	0.448	19
" .602	15.37	0.122	23	14.56	0.534	10	15.37	0.115	23	14.99	....	..	15.88	0.227	28	14.66	0.079	*11*
3390.604	15.11	0.094	16	15.11	0.309	*29*	14.61	0.248	*15*	14.27	....	..	14.66	0.453	*24*	15.47	0.202	15
3408.568	14.56	0.005	20	14.66	0.093	*15*	14.66	0.326	*01*	15.37	....	..	16.20	0.332	45	15.83	0.289	35
3409.544	14.89	0.480	05	14.94	0.501	*06*	14.89	0.068	06	14.99	....	..	15.47	0.330	*28*	15.78	0.325	27
" .623	14.71	0.058	00	14.56	0.012	10	15.37	0.147	13	15.37	....	..	15.88	0.409	14	15.73	0.404	26
3411.603	14.66	0.032	14	15.37	0.287	00	14.66	0.277	*04*	15.47	....	..	15.47	0.434	*18*	14.61	0.031	17
3412.560	14.66	0.487	11	15.11	0.108	24	14.56	0.001	*08*	14.56	....	..	15.83	0.413	10	14.56	0.048	00
3413.569	14.56	0.493	16	14.56	0.549	16	15.37	0.393	39	15.37	....	..	15.57	0.445	17	14.89	0.116	*06*
3414.620	14.56	0.040	*02*	15.73	0.464	36	15.11	0.210	09	14.99	....	..	14.17	0.029	*13*	15.78	0.226	40
3415.489	15.73	0.407	*01*	15.10	0.196	*02*	15.21	0.463	*01*	14.61	....	..	15.73	0.410	*01*	15.11	0.154	*02*
" .531	15.73	0.449	15	15.37	0.238	11	14.89	0.505	*24*	14.89	....	..	14.89	0.452	*06*	15.42	0.196	13
" .572	14.45	0.490	03	15.40	0.279	05	14.66	0.546	*23*	14.89	....	..	14.27	0.004	14	15.47	0.237	07
" .614	14.56	0.031	05	15.32	0.321	*10*	14.61	0.588	*06*	14.99	....	..	14.22	0.046	*21*	15.73	0.279	25
3419.548	15.42	0.455	*05*	15.11	0.278	*23*	14.89	0.204	*18*	14.22	....	..	14.56	0.069	*08*	14.56	0.449	*19*
3422.494	15.47	0.392	*28*	15.16	0.384	*31*	14.99	0.066	17	14.66	....	..	14.56	0.083	*19*	14.89	0.102	*01*
" .591	14.56	0.489	12	15.04	0.481	*22*	15.26	0.163	02	14.22	....	..	15.42	0.180	*03*	15.21	0.199	*09*
3423.506	15.83	0.401	09	14.99	0.259	*32*	14.89	0.462	*33*	14.66	....	..	14.66	0.117	*38*	15.16	0.173	*06*
3666.649	15.78	0.330	05	15.27	0.238	01	14.99	0.597	34	14.61	....	..	14.61	0.329	R	14.89	0.099	02
3673.681	15.73	0.341	00	15.78	0.453	36	15.37	0.228	51	14.45	....	..	14.56	0.030	25	14.66	0.075	*09*
3693.638	15.21	0.239	*40*	14.61	0.525	06	14.79	0.448	*41*	14.61	....	..	*15.3*	0.435	..	*15.3*	0.273	..
3694.577	14.94	0.175	*45*	*15.6*	0.327	..	15.01	0.154	*23*	14.56	....	..	*16.0*	0.396	..	15.16	0.272	*32*
" .615	15.61	0.213	07	14.94	0.365	*52*	15.21	0.192	05	15.37	....	..	16.10	0.434	47	15.57	0.310	07
3695.519	15.21	0.114	12	15.08	0.133	12	15.27	0.479	07	15.27	....	..	*16.4*	0.361	..	15.73	0.273	26
" .561	15.16	0.156	*16*	15.05	0.175	*01*	15.30	0.521	25	15.05	....	..	*16.5*	0.403	..	15.57	0.315	07
" .602	15.73	0.197	26	15.08	0.216	*11*	15.16	0.562	38	14.94	....	..	15.78	0.444	48	15.61	0.356	10
" .644	15.57	0.239	*03*	15.57	0.258	25	14.66	0.604	02	14.27	....	..	14.17	0.486	07	15.57	0.398	09
3698.504	14.94	0.091	00	15.16	0.278	*19*	14.99	0.380	11	14.56	....	..	*15.7*	0.413	..	14.94	0.435	*21*
3699.499	14.94	0.083	04	15.11	0.136	15	15.27	0.142	04	15.05	....	..	*16.4*	0.430	..	14.56	0.019	16
" .542	14.99	0.126	*16*	15.27	0.179	19	15.57	0.185	38	15.04	....	..	14.17	0.473	*05*	14.73	0.062	06

J. D.	No. 33. Per. $0^d.501472$			No. 34. Per. $0^d.568140$			No. 35. Per. $0^d.616770$			No. 36. Per. not det'd.			No. 37. Per. $0^d.488794$			No. 38. Per. $0^d.470439$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
3699.584	15.47	0.168	11	15.21	0.221	00	15.16	0.227	28	15.08	....	..	14.56	0.026	30	15.05	0.104	14
3713.513	14.61	0.055	*09*	14.66	0.515	*04*	14.79	0.587	11	15.27	....	..	*16.4*	0.269	..	15.37	0.390	*14*
" .680	15.27	0.222	*29*	14.61	0.114	*28*	15.08	0.137	*13*	14.76	....	..	*16.5*	0.436	..	14.94	0.087	12
3717.517	14.66	0.048	03	14.42	0.542	00	14.76	0.273	06	14.89	....	..	*16.4*	0.363	..	15.11	0.160	*05*
" .692	15.47	0.223	*09*	14.79	0.149	*20*	15.11	0.448	*09*	14.66	....	..	*16.0*	0.049	..	14.94	0.335	*56*
" .817	15.42	0.348	*31*	*15.6*	0.274	..	14.66	0.573	*06*	....	....	..	*16.0*	0.174	..	14.39	0.460	*05*
3724.535	14.66	0.045	04	14.89	0.174	*18*	15.21	0.507	08	14.27	....	..	15.42	0.049	R	14.94	0.121	*05*
" .676	15.57	0.186	15	15.11	0.315	*30*	14.66	0.031	01	14.66	....	..	15.73	0.190	23	15.78	0.262	31
3748.572	14.22	0.011	*16*	14.94	0.349	*50*	15.11	0.490	*07*	14.61	....	..	15.26	0.135	06	15.16	0.166	*02*
3775.556	15.76	0.417	02	14.76	0.062	08	14.79	0.336	10	14.89	....	..	15.83	0.235	21	15.21	0.335	*30*
3960.869	15.42	0.186	00	14.99	0.162	*04*	15.27	0.001	64	14.56	....	..	....	....	..	15.83	0.295	34
4014.745	15.08	0.404	*66*	14.71	0.065	01	....	....	..	....	....	..	....	....	..	14.71	0.071	*01*
4037.635	15.44	0.227	*13*	15.37	0.229	14	14.89	0.288	21	14.71	....	..	14.99	0.321	R	15.42	0.380	*09*
" .663	15.42	0.255	*22*	15.37	0.257	07	14.71	0.316	04	14.71	....	..	....	....	..	15.42	0.408	*04*
4041.675	15.84	0.255	20	15.42	0.292	04	14.71	0.010	08	14.51	....	..	14.71	0.450	*24*	15.22	0.186	*04*
4052.600	15.14	0.147	*13*	15.26	0.422	*22*	14.89	0.450	*32*	14.99	....	..	15.47	0.133	28	15.47	0.290	*02*
4058.548	14.74	0.078	*13*	15.26	0.121	34	15.26	0.230	41	15.06	....	..	15.58	0.216	00	15.26	0.123	26
" .662	15.32	0.192	*12*	15.42	0.235	17	14.56	0.344	*15*	15.16	....	..	15.58	0.330	*17*	15.26	0.237	*15*
" .780	15.68	0.310	*03*	15.83	0.353	38	14.99	0.462	*22*	15.16	....	..	15.26	0.448	06	15.58	0.355	07
" .854	15.77	0.384	02	15.37	0.427	*10*	15.06	0.536	10	15.11	....	..	14.40	0.033	08	15.26	0.429	00
4066.635	15.18	0.141	*06*	15.26	0.254	*03*	14.56	0.299	*11*	14.40	....	..	14.27	0.482	17	15.21	0.212	*13*
4067.636	15.06	0.139	*16*	14.82	0.118	*09*	14.66	0.067	*17*	14.56	....	..	14.27	0.017	06	15.21	0.272	*26*
4069.560	14.61	0.057	*10*	15.37	0.338	*06*	15.06	0.141	*16*	14.66	....	..	14.27	0.474	07	15.47	0.315	*03*
" .795	15.80	0.292	10	14.40	0.005	*03*	14.66	0.376	*17*	14.27	....	..	15.26	0.220	*33*	14.56	0.079	*21*
4070.655	15.07	0.149	*22*	15.26	0.297	*12*	14.66	0.002	03	14.61	....	..	14.82	0.103	*12*	14.56	0.469	21
4071.538	14.34	0.029	*15*	14.61	0.044	00	14.66	0.268	*05*	14.82	....	..	14.27	0.008	13	15.26	0.411	*18*
" .747	15.64	0.238	04	15.21	0.253	*08*	15.21	0.477	00	14.56	....	..	15.21	0.217	*37*	15.04	0.149	*08*
4072.538	14.27	0.027	*20*	15.26	0.475	*06*	14.56	0.035	*10*	14.82	....	..	14.27	0.031	*05*	14.61	0.470	26
" .745	15.63	0.234	04	14.66	0.114	*25*	14.99	0.242	20	14.99	....	..	*15.5*	0.238	..	15.21	0.207	*12*
4073.553	14.48	0.039	*09*	15.26	0.354	*20*	14.82	0.433	*35*	14.04	....	..	14.66	0.068	04	14.66	0.074	*09*
" .758	15.56	0.244	*06*	14.40	0.559	*01*	14.56	0.021	*08*	14.66	....	..	15.58	0.273	*11*	15.37	0.279	*11*
4074.561	14.56	0.044	*06*	15.06	0.226	*16*	15.11	0.207	05	14.61	....	..	14.66	0.098	*23*	14.94	0.141	*13*
4085.663	14.96	0.113	*12*	14.61	0.533	12	15.11	0.208	05	14.82	....	..	15.06	0.447	*14*	15.37	0.423	01
4086.608	14.66	0.055	*02*	15.47	0.342	03	15.26	0.536	30	....	....	..	*15.5*	0.414	..	15.26	0.427	*03*
4092.573	14.40	0.003	05	15.06	0.057	40	14.66	0.333	*02*	14.82	....	..	14.27	0.025	*01*	15.26	0.276	*21*
4093.532	15.18	0.460	*15*	15.26	0.448	*18*	14.61	0.059	*15*	14.56	....	..	14.04	0.007	*09*	15.26	0.294	*23*
" .762	15.38	0.189	*05*	15.06	0.110	18	14.82	0.289	13	15.26	....	..	*15.5*	0.237	..	14.82	0.054	21
4133.607	15.78	0.417	03	14.99	0.185	*11*	14.89	0.043	19	14.66	....	..	14.08	0.000	*02*	15.47	0.382	*04*
4147.519	15.88	0.288	19	15.37	0.462	*02*	14.99	0.387	08	15.11	....	..	....	....	..	15.21	0.181	*03*
4437.629	14.66	0.046	03	15.21	0.252	*08*	14.56	0.615	*07*	14.17	....	..	14.17	0.481	07	14.22	0.030	*23*
4795.632	14.17	0.499	*18*	....	....	..	15.16	0.274	46	....	....	..	....	....	..	14.27	0.029	*17*
4846.568	15.73	0.285	04	14.99	0.131	04	14.51	0.018	*12*	15.21	....	..	....	....	..	15.21	0.157	07
4860.582	15.78	0.258	13	14.94	0.509	06	15.73	0.463	51	15.78	....	..	15.42	0.139	20	14.51	0.058	*12*
4876.513	15.21	0.142	*03*	14.61	0.532	11	14.89	0.358	13	14.56	....	..	....	....	..	14.56	0.465	19
4886.535	14.99	0.134	*22*	15.42	0.328	00	14.89	0.512	*20*	15.16	....	..	....	....	..	14.99	0.137	*07*
5560.608	15.61	0.229	04	14.66	0.019	17	15.37	0.455	15	14.71	....	..	16.4	0.212	..	14.71	0.071	*02*
5562.605	15.47	0.220	*08*	15.78	0.311	38	14.71	0.602	07	14.89	....	..	16.3	0.254	..	15.37	0.186	12
5563.594	15.47	0.206	*03*	15.37	0.164	33	14.89	0.358	13	15.47	....	..	16.3	0.265	..	15.37	0.234	*02*
5579.551	15.04	0.116	*06*	14.89	0.213	*29*	14.71	0.279	02	14.66	....	..	14.32	0.092	*52*	15.21	0.196	*07*
5581.558	14.99	0.117	*12*	14.66	0.516	*02*	15.11	0.435	*07*	14.84	....	..	15.16	0.144	*09*	15.47	0.322	*03*

J. D.	No. 33. Per. 0d.501472			No. 34. Per. 0d.568140			No. 35. Per. 0d.616770			No. 36. Per. not det'd.			No. 37. Per. 0d.488794			No. 38. Per. 0d.470439		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
5899.564	15.42	0.190	01	15.42	0.363	04	15.42	0.188	24	14.27	....	..	15.37	0.433	28	15.42	0.311	08
5901.555	15.22	0.175	18	14.71	0.082	06	14.51	0.329	16	14.71	....	..	14.37	0.469	06	15.42	0.420	02
" .646	15.83	0.266	17	14.89	0.173	17	14.89	0.420	23	14.79	....	..	14.32	0.072	32	14.27	0.041	25
6633.655	15.15	0.126	00	15.54	0.417	06	14.61	0.323	06	14.66	....	..	15.42	0.356	34	14.56	0.047	00
6634.509	14.89	0.479	01	14.89	0.135	07	14.71	0.560	09	14.71	....	..	14.99	0.232	63	15.42	0.430	19
" .566	14.51	0.034	03	14.99	0.192	13	14.61	0.000	02	14.51	....	..	15.42	0.289	29	14.71	0.017	33
" .682	15.12	0.150	17	15.42	0.308	03	15.15	0.116	01	14.51	....	..	15.42	0.405	33	14.99	0.133	05
7021.639	14.89	0.472	08	15.42	0.362	04	14.79	0.358	04	14.71	....	..	14.99	0.237	64	15.73	0.389	23
7023.629	15.57	0.456	12	14.66	0.079	08	14.99	0.498	18	14.71	....	..	15.37	0.272	32	14.32	0.027	11
" .678	14.27	0.004	08	14.71	0.128	22	14.56	0.547	33	14.89	....	..	15.57	0.321	17	14.61	0.076	15
8157.558	14.66	0.056	01	14.51	0.001	09	14.71	0.187	46	14.42	....	..	14.99	0.199	54	15.42	0.198	12
9533.816	15.57	0.274	11	15.57	0.224	35	15.54	0.431	38	14.99	....	..	14.27	0.013	09	14.79	0.422	57
" .888	15.73	0.346	00	15.37	0.296	01	14.89	0.503	25	14.99	....	..	14.89	0.085	12	14.79	0.023	38
" .914	15.42	0.372	32	15.42	0.322	00	14.89	0.529	13	14.89	....	..	14.89	0.111	13	14.79	0.049	21
" .947	15.37	0.405	37	1 ·37	0.355	09	14.51	0.562	29	14.89	....	..	15.37	0.144	10	14.99	0.082	19
9537.761	15.42	0.208	09	15.42	0.192	30	14.99	0.059	22	14.99	....	..	14.79	0.048	35	14.99	0.133	05
" .786	15.73	0.233	15	15.37	0.217	18	14.99	0.084	00	14.71	....	..	14.89	0.073	24	15.22	0.158	08
" .812	15.57	0.259	08	15.42	0.243	15	15.37	0.110	25	14.89	....	..	15.22	0.099	32	15.22	0.184	03
" .836	15.73	0.283	04	15.73	0.267	40	15.15	0.134	06	14.66	....	..	14.99	0.123	14	15.27	0.208	05
" .874	15.68	0.321	04	15.57	0.305	18	15.15	0.172	08	14.79	....	..	15.42	0.161	05	15.42	0.246	00
" .899	15.57	0.346	16	15.73	0.330	30	14.79	0.197	34	14.71	....	..	15.42	0.186	06	15.42	0.271	05
" .924	15.83	0.371	09	15.57	0.355	11	14.89	0.222	00	14.89	....	..	15.42	0.211	15	15.42	0.296	07
" .950	15.57	0.397	18	15.42	0.381	05	14.71	0.248	06	14.79	....	..	15.73	0.237	10	15.37	0.322	13

J. D.	No. 39. Per. 0d.589033			No. 40. Per. not det'd.			No. 41. Per. 0d.488578			No. 42. Per. 25d.74			No. 43. Per. 0d.660235			No. 44. Per. 0d.495797		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
1145.794	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
1148.796	14.66	0.176	38	14.94	....	..	14.22	0.475	08	10.91	3.06	39	....	....	..	14.94	0.226	12
1155.796	....	....	..	....	....	..	....	....	..	11.83	10.06	00	....	....	..	14.66	0.285	00
1161.809	14.94	0.230	28	15.11	....	..	....	...	..	12.04	16.07	15	....	....	..	14.66	0.348	41
1174.794	....	....	..	....	....	..	....	....	..	11.28	3.31	05	....	....	..	....	....	..
1178.785	14.61	0.124	17	15.16	....	..	....	....	..	11.53	7.30	03	14.94	0.195	15	....	....	..
1199.701	14.99	0.424	58	15.16	....	..	14.94	0.079	27	10.86	2.48	41	14.66	0.643	04	14.56	0.064	24
3346.540	15.42	0.238	17	14.99	....	..	14.94	0.106	00	12.04	12.90	03	15.37	0.398	01	15.05	0.102	00
3366.544	15.47	0.215	30	14.66	....	..	14.66	0.078	01	11.38	7.16	16	14.66	0.595	11	14.56	0.274	10
3369.698	....	....	..	15.16	....	..	....	....	..	11.75	10.32	09	15.26	0.448	16	14.99	0.453	07
3370.528	14.61	0.076	08	15.37	....	..	15.32	0.154	08	12.04	11.15	11	14.89	0.618	18	14.76	0.292	08
3371.529	15.73	0.487	20	14.99	....	..	15.21	0.178	15	12.14	12.15	12	15.21	0.299	06	14.66	0.301	08
3374.502	14.99	0.515	27	14.89	....	..	15.42	0.219	08	12.14	15.12	02	14.66	0.630	05	14.51	0.299	21
" .538	14.22	0.551	22	15.21	....	..	....	....	..	12.14	15.16	02	14.56	0.006	12	14.94	0.335	06
3376.502	14.94	0.159	00	15.42	....	..	15.42	0.265	19	12.24	17.12	03	14.61	0.650	08	14.79	0.316	02
" .543	15.11	0.200	01	15.47	....	..	15.42	0.306	24	12.14	17.16	08	14.66	0.031	04	15.05	0.357	07
" .584	15.11	0.241	16	15.47	....	..	15.73	0.347	06	12.20	17.20	02	14.83	0.072	04	15.42	0.398	20
" .677	15.42	0.334	07	15.11	....	..	15.16	0.440	00	12.14	17.30	08	14.56	0.165	48	14.83	0.491	16
3377.578	14.27	0.057	15	14.99	....	..	15.47	0.364	20	12.83	18.20	60	15.11	0.405	28	14.99	0.400	24
3378.579	15.37	0.469	20	14.89	....	..	15.73	0.388	06	12.24	19.20	00	14.66	0.086	18	15.16	0.410	07
3380.500	14.22	0.034	08	14.89	....	..	15.42	0.354	25	12.83	21.12	63	14.56	0.026	13	14.99	0.348	08
" .602	14.94	0.136	11	15.37	....	..	14.89	0.456	34	12.14	21.22	04	15.37	0.128	42	15.37	0.450	28
3390.604	14.89	0.124	11	14.94	....	..	15.21	0.198	22	11.34	5.48	10	15.01	0.227	15	14.71	0.040	01

J. D.	No. 39. Per. $0^d.589033$			No. 40. Per. not det'd.			No. 41. Per. $0^d.488578$			No. 42. Per. $25^d.74$			No. 43. Per. $0^d.660235$			No. 44. Per. $0^d.495797$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
3408.568	15.73	0.417	16	15.73	....	..	14.61	0.085	*12*	11.44	23.45	*16*	15.27	0.364	*08*	15.21	0.155	04
3409.544	14.99	0.215	*19*	15.37	....	..	14.61	0.084	*11*	11.28	24.42	05	14.56	0.020	*13*	15.21	0.140	04
" .623	15.37	0.294	*14*	15.37	....	..	15.37	0.163	09	10.96	24.50	*27*	14.76	0.099	*11*	14.99	0.219	13
3411.603	15.47	0.507	07	14.89	....	..	15.37	0.188	*03*	10.86	0.74	*34*	14.66	0.098	*20*	15.08	0.215	20
3412.560	15.37	0.286	*03*	14.94	....	..	15.42	0.168	10	11.34	1.70	11	15.23	0.395	*15*	15.37	0.181	26
3413.569	14.56	0.117	*17*	15.21	....	..	15.37	0.200	*06*	11.28	2.71	*01*	14.61	0.084	*22*	14.99	0.198	*03*
3414.620	14.17	0.579	04	15.73	....	..	15.42	0.274	*21*	11.28	3.76	*06*	15.37	0.474	*07*	14.71	0.258	04
3415.489	15.37	0.270	01	15.37	....	..	15.11	0.166	*18*	12.04	4.63	R	14.66	0.023	*03*	15.37	0.135	21
" .531	15.47	0.312	03	15.37	....	..	15.37	0.208	*09*	11.44	4.67	05	14.66	0.065	*12*	15.08	0.177	*03*
" .572	15.73	0.353	21	15.37	....	..	15.73	0.249	15	11.44	4.71	05	14.84	0.196	*06*	14.66	0.218	*21*
" .614	15.73	0.395	16	15.21	....	..	15.42	0.291	*22*	11.44	4.75	04	14.89	0.148	*12*	14.66	0.260	00
3419.548	15.37	0.206	22	15.11	....	..	16.42	0.316	76	11.44	8.69	*26*	14.99	0.120	06	14.89	0.228	09
3422.494	14.99	0.207	*16*	15.42	....	..	....	....	..	12.04	11.63	07	15.33	0.425	*07*	14.89	0.199	*13*
" .591	15.42	0.304	00	15.47	....	..	....	....	..	12.04	11.73	06	15.30	0.522	*03*	14.56	0.296	*15*
3423.506	14.56	0.041	23	15.37	....	..	15.73	0.365	06	12.00	12.65	*05*	14.94	0.117	01	14.71	0.219	*15*
3666.649	15.61	0.502	14	15.33	....	..	15.83	0.197	40	11.38	24.13	08	15.05	0.294	*22*	15.30	0.422	08
3673.681	15.47	0.466	*10*	14.66	....	..	15.37	0.388	*30*	11.72	5.42	29	14.61	0.063	*16*	14.61	0.017	*06*
3693.638	*15.3*	0.395	..	14.66	....	..	*15.3*	0.314	..	10.76	25.38	*44*	15.26	0.213	13	14.94	0.142	*23*
3694.577	15.16	0.156	23	15.05	....	..	16.08	0.276	45	....	....	..	15.21	0.492	*22*	15.16	0.089	20
" .615	15.30	0.194	20	14.89	....	..	16.10	0.314	44	11.28	0.62	08	15.93	0.530	67	14.99	0.127	*14*
3695.519	15.21	0.509	*15*	15.08	....	..	15.93	0.240	37	11.28	1.52	05	15.05	0.113	13	14.89	0.040	17
" .561	14.56	0.551	11	14.99	....	..	15.73	0.282	10	11.34	1.56	11	15.05	0.155	03	14.99	0.082	08
" .602	14.45	0.003	31	14.94	....	..	15.96	0.323	30	11.38	1.60	15	15.11	0.196	01	15.05	0.123	*08*
" .644	14.42	0.045	08	15.05	....	..	15.78	0.365	11	11.38	1.64	15	15.11	0.238	*07*	15.21	0.165	04
3698.504	14.42	0.549	*07*	14.76	....	..	15.78	0.294	12	11.68	4.50	31	15.30	0.457	*13*	14.99	0.050	26
3699.499	15.57	0.366	03	15.37	....	..	15.61	0.312	*05*	11.38	5.50	*05*	15.16	0.132	19	15.05	0.053	31
" .542	15.21	0.409	*35*	15.73	....	..	15.96	0.355	29	12.00	5.54	57	15.08	0.175	01	14.89	0.096	*13*
" .584	15.61	0.451	04	15.61	....	..	15.73	0.397	07	11.78	5.58	35	15.27	0.217	13	15.30	0.138	14
3713.513	15.27	0.243	00	15.47	....	..	15.27	0.157	03	12.49	19.51	25	15.16	0.281	*09*	14.94	0.185	*14*
" .680	15.21	0.410	*35*	14.94	....	..	15.73	0.324	07	12.42	19.68	18	15.73	0.448	31	15.05	0.352	*03*
3717.517	14.94	0.124	15	14.89	....	..	15.61	0.252	02	11.72	23.52	22	15.37	0.323	07	14.76	0.223	*06*
" .692	15.30	0.299	*11*	15.47	....	..	15.78	0.427	28	11.34	23.69	*06*	15.57	0.498	13	15.11	0.398	*11*
" .817	15.42	0.424	*15*	14.79	....	..	14.66	0.064	16	10.86	23.82	*51*	14.79	0.623	07	14.66	0.027	*03*
3724.535	14.66	0.074	14	15.05	....	..	15.61	0.430	23	11.94	4.80	55	14.94	0.079	12	14.66	0.300	*07*
" .676	15.21	0.215	02	15.30	....	..	14.66	0.083	*06*	11.34	4.94	*06*	15.08	0.220	*07*	15.21	0.441	08
3748.572	14.56	0.549	07	14.89	....	..	14.27	0.038	00	11.34	3.09	03	15.16	0.347	*17*	14.61	0.043	*11*
3775.556	15.57	0.438	00	14.89	....	..	15.21	0.151	*01*	11.38	4.34	01	15.21	0.262	*01*	14.79	0.253	11
3960.869	15.42	0.205	27	14.71	....	..	15.42	0.293	*23*	11.90	9.47	13	14.79	0.049	06	14.89	0.138	*27*
4014.745	15.42	0.479	*13*	14.99	....	..	15.57	0.425	07	11.72	11.86	*28*	15.42	0.445	00	15.04	0.468	11
4037.635	15.42	0.397	*14*	14.71	....	..	15.68	0.352	01	11.94	9.02	22	15.37	0.227	21	14.71	0.056	*04*
" .663	*15.6*	0.425	..	14.51	....	..	15.37	0.380	*30*	11.94	9.04	22	15.42	0.255	21	14.71	0.084	*20*
4041.675	15.57	0.314	11	15.22	....	..	14.07	0.483	*03*	12.04	13.06	*04*	15.22	0.306	*06*	14.99	0.130	*15*
4052.600	14.22	0.047	*13*	14.66	....	..	15.26	0.171	*07*	11.41	23.98	09	14.66	0.007	*02*	15.16	0.147	*01*
4058.548	14.66	0.105	*02*	15.06	....	..	15.37	0.256	*23*	11.71	4.19	35	14.82	0.013	13	15.26	0.145	09
" .662	15.21	0.219	02	14.82	....	..	15.47	0.370	*20*	11.72	4.30	35	14.89	0.127	*06*	14.66	0.259	00
" .780	15.42	0.337	*07*	15.26	....	..	14.04	0.488	*06*	11.74	4.42	37	15.06	0.245	*13*	14.94	0.377	*24*
" .854	15.26	0.411	*30*	14.89	....	..	14.61	0.073	02	11.58	4.49	21	15.26	0.319	*04*	15.11	0.451	03
4066.635	15.06	0.535	25	14.99	....	..	14.27	0.037	00	11.80	12.28	*23*	15.06	0.177	*01*	14.66	0.300	*07*
4067.636	15.37	0.357	*16*	15.21	....	..	14.40	0.061	*06*	12.12	13.28	04	15.42	0.518	03	14.66	0.309	*12*
4069.560	15.58	0.514	32	15.26	....	..	14.17	0.031	*06*	12.15	15.20	*01*	15.26	0.461	*17*	14.61	0.250	*09*

J. D.	No. 39. Per. $0^d.589033$			No. 40. Per. not det'd.			No. 41. Per. $0^d.488578$			No. 42. Per. $25^d.74$			No. 43. Per. $0^d.660235$			No. 44. Per. $0^d.405797$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
4069.795	14.99	0.160	03	15.11	....	..	15.58	0.266	*04*	12.17	15.44	00	14.66	0.036	*05*	14.99	0.485	28
4070.655	15.37	0.431	*20*	14.66	....	..	15.21	0.149	00	12.22	16.30	03	15.21	0.236	03	14.89	0.353	*20*
4071.538	14.82	0.136	*02*	14.99	....	..	14.40	0.054	*01*	12.17	17.18	*05*	15.26	0.458	*16*	14.56	0.245	*15*
" .747	15.37	0.345	*14*	15.11	....	..	15.58	0.263	*03*	12.31	17.39	09	14.66	0.007	*02*	15.06	0.454	00
4072.538	14.66	0.547	11	14.82	....	..	14.66	0.077	00	12.49	18.18	26	14.99	0.138	01	14.61	0.253	*07*
" .745	15.06	0.165	08	15.21	....	..	15.58	0.284	*06*	12.22	18.38	*01*	15.47	0.345	14	14.82	0.460	*20*
4073.553	15.58	0.384	02	14.66	....	..	14.99	0.115	*01*	12.31	19.19	07	15.37	0.493	*07*	14.66	0.276	00
" .758	14.04	0.000	*10*	14.99	....	..	15.58	0.320	*08*	12.42	19.40	18	14.71	0.038	00	14.99	0.481	26
4074.561	15.26	0.214	08	15.06	....	..	15.06	0.146	*11*	12.15	20.20	*08*	15.11	0.180	04	14.82	0.293	13
4085.663	14.89	0.124	10	14.99	....	..	14.17	0.011	03	11.80	5.56	36	14.82	0.058	06	14.71	0.487	01
4086.608	15.47	0.480	*08*	14.82	....	..	14.22	0.467	*04*	11.64	6.51	14	15.26	0.343	*07*	15.11	0.441	*02*
4092.573	14.27	0.555	*05*	14.71	....	..	14.61	0.081	*08*	11.82	12.47	*21*	15.21	0.366	*15*	14.94	0.456	*11*
4093.532	15.37	0.336	*12*	14.66	....	..	14.56	0.062	06	12.07	13.43	*03*	14.66	0.004	*02*	14.99	0.424	*22*
" .762	14.27	0.566	10	15.06	....	..	15.26	0.292	*39*	12.07	13.66	*04*	15.06	0.234	*12*	15.11	0.158	*06*
4133.607	16.0	0.357	..	14.99	....	..	14.66	0.074	01	11.07	2.03	*17*	15.78	0.465	35	14.99	0.339	*04*
4147.519	14.66	0.132	*16*	14.99	....	..	15.47	0.306	*19*	12.17	15.94	*01*	15.37	0.512	*05*	15.37	0.369	20
4437.629	15.88	0.438	31	15.42	....	..	15.42	0.200	*01*	12.00	22.91	07	14.99	0.119	06	15.16	0.437	*01*
4795.632	15.47	0.309	03	15.47	....	..	14.56	0.076	*05*	12.20	20.55	*02*	15.37	0.275	13	14.71	0.475	*12*
4846.568	14.12	0.588	*01*	14.89	....	..	15.37	0.200	*07*	12.14	20.01	*10*	15.47	0.373	11	15.21	0.344	15
4860.582	15.78	0.465	21	14.89	....	..	14.27	0.045	*06*	11.38	8.28	*26*	15.47	0.522	14	14.66	0.476	*16*
4876.513	16.10	0.492	58	15.47	....	..	15.93	0.341	26	11.28	24.21	00	14.89	0.607	16	14.89	0.045	16
4886.535	....	....	..	14.76	....	..	14.89	0.103	*02*	11.44	8.50	*22*	14.99	0.065	21	15.16	0.151	*01*
5560.608	14.89	0.131	08	15.16	....	..	15.42	0.427	*06*	12.20	13.33	11	15.11	0.038	40	15.01	0.436	*16*
5562.605	15.47	0.361	*07*	15.42	....	..	14.17	0.470	*05*	12.24	15.32	07	14.76	0.055	00	14.94	0.450	*15*
5563.594	14.99	0.172	*03*	15.78	....	..	14.17	0.482	06	12.14	16.31	*05*	15.37	0.383	00	14.99	0.448	*11*
5579.551	15.27	0.225	06	14.76	....	..	15.47	0.316	*19*	11.28	6.53	*22*	15.47	0.495	04	14.89	0.043	16
5581.558	15.61	0.465	04	14.99	....	..	15.47	0.368	*20*	12.10	8.54	43	15.27	0.521	*07*	14.99	0.067	18
5899.564	15.57	0.393	01	15.22	....	..	15.57	0.310	*09*	12.14	17.66	*09*	15.32	0.294	06	14.71	0.267	05
5901.555	14.32	0.028	07	15.32	....	..	15.57	0.347	*10*	12.14	19.66	*10*	15.42	0.304	14	14.79	0.275	13
" .646	14.71	0.119	*05*	14.79	....	..	15.22	0.438	00	12.24	19.75	00	15.57	0.395	20	14.99	0.366	*16*
6633.655	14.51	0.549	02	15.15	....	..	14.51	0.068	*02*	11.38	5.30	*05*	15.22	0.203	11	14.99	0.083	08
6634.509	15.42	0.225	20	15.42	....	..	15.22	0.434	*02*	11.44	6.15	*04*	15.42	0.397	04	14.79	0.441	*35*
" .566	15.42	0.282	04	15.42	....	..	14.12	0.002	02	11.34	6.21	*14*	15.42	0.454	*01*	14.71	0.002	04
" .682	15.37	0.398	*19*	14.79	....	..	14.89	0.118	*12*	11.34	6.32	*15*	14.79	0.570	*11*	15.27	0.118	15
7021.639	15.57	0.360	04	15.42	....	..	14.99	0.121	*04*	11.44	7.18	*11*	14.66	0.629	*06*	15.27	0.354	16
7023.629	14.32	0.583	19	15.22	....	..	15.15	0.157	*09*	11.44	9.17	*29*	14.71	0.639	00	14.99	0.360	*14*
" .678	14.27	0.043	*06*	14.99	....	..	15.73	0.206	29	11.38	9.22	*35*	14.71	0.028	01	15.42	0.409	19
8157.558	14.51	0.034	20	14.66	....	..	14.89	0.097	04	11.94	10.54	07	15.37	0.284	11	14.99	0.402	*24*
9533.816	15.42	0.311	*02*	14.99	....	..	14.32	0.030	09	12.00	22.58	*02*	14.71	0.612	*01*	14.89	0.327	*02*
" .888	15.42	0.383	*14*	14.99	....	..	14.89	0.102	00	11.94	22.65	*08*	14.79	0.024	09	14.99	0.399	*24*
" .914	15.42	0.409	*14*	15.42	....	..	15.22	0.128	16	....	....	..	14.99	0.050	26	15.42	0.425	20
" .947	15.42	0.442	*15*	15.37	....	..	14.99	0.161	*28*	11.75	22.71	*25*	14.89	0.083	06	15.15	0.458	11
9537.761	14.99	0.133	17	15.32	....	..	14.66	0.067	13	11.38	0.78	17	14.66	0.596	*11*	14.99	0.306	25
" .786	14.89	0.158	*05*	15.42	....	..	14.79	0.092	*01*	11.48	0.81	27	14.76	0.621	03	15.22	0.331	27
" .812	14.89	0.184	*18*	15.42	....	..	14.89	0.118	*12*	11.38	0.83	17	14.79	0.647	10	14.99	0.357	*12*
" .836	14.99	0.208	*16*	15.42	....	..	14.89	0.142	*27*	11.38	0.86	17	14.79	0.011	10	15.22	0.381	02
" .874	15.32	0.246	04	14.89	....	..	15.37	0.180	00	11.38	0.89	17	14.89	0.049	16	15.15	0.419	*08*
" .899	15.42	0.271	06	14.94	....	..	15.57	0.205	11	11.38	0.92	17	14.99	0.074	17	15.42	0.444	30
" .924	15.42	0.296	01	14.89	....	..	15.42	0.230	*11*	11.38	0.94	17	15.12	0.099	24	15.42	0.469	50
" .950	15.37	0.322	*11*	14.89	....	..	15.42	0.256	*17*	11.28	0.97	06	14.99	0.125	05	15.12	0.495	45

J. D.	No. 45. Per. 0d.616637			No. 46. Per. not det'd.			No. 47. Per. 0d.539725			No. 48. Per. not det'd.			No. 49. Per. not det'd.			No. 50. Per. 106d.0		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
1145.794	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	13.78	72.8	*39*
1148.796	15.16	0.196	24	....	....	..	....	....	...	14.66	....	..	....	....	..	13.78	75.8	*39*
1155.796	....	....	..	....	....	..	14.71	0.256	*72*	14.66	....	..	....	....	..	13.78	82.8	*26*
1161.809	....	....	..	....	....	..	14.94	0.332	*69*	14.66	....	..	....	....	..	13.83	88.8	08
1174.794	....	....	..	....	....	..	....	....	..	14.66	....	..	....	....	..	13.83	101.8	83
1178.785	14.99	0.586	16	....	....	..	14.66	0.037	30	14.92	....	..	....	....	..	13.40	105.8	40
1199.701	15.16	0.537	*21*	....	....	..	....	....	..	14.79	....	..	....	....	..	13.83	20.7	43
3346.540	14.94	0.246	*09*	15.47	....	..	15.57	0.256	14	14.66	....	..	15.47	....	..	13.73	47.5	*28*
3366.544	15.42	0.517	04	15.37	....	..	15.47	0.290	*06*	14.89	....	..	15.61	....	..	14.51	67.5	33
3369.698	14.94	0.588	14	15.42	....	..	15.42	0.206	18	14.83	....	..	15.46	....	..	14.17	70.7	*01*
3370.528	14.89	0.185	00	15.57	....	..	15.16	0.496	*38*	14.99	....	..	15.73	....	..	14.22	71.5	04
3371.529	15.11	0.569	00	15.73	....	..	15.37	0.418	*39*	14.89	....	..	15.42	....	..	14.27	72.5	08
3374.502	15.11	0.459	*27*	15.47	....	..	15.08	0.153	07	14.76	....	..	15.37	....	..	14.22	75.5	05
" .538	15.46	0.495	07	15.42	....	..	15.21	0.189	04	14.66	....	..	15.36	....	..	14.17	75.5	00
3376.502	14.66	0.609	24	15.42	....	..	14.66	0.533	00	14.89	....	..	15.42	....	..	14.27	77.5	11
" .543	14.56	0.034	17	15.61	....	..	14.56	0.035	21	15.11	....	..	15.61	....	..	14.27	77.5	10
" .584	14.61	0.075	10	15.73	....	..	14.71	0.076	11	15.47	....	..	15.78	....	..	14.17	77.6	00
" .677	14.61	0.168	*22*	15.37	....	..	15.37	0.169	29	14.66	....	..	15.42	....	..	13.78	77.7	*39*
3377.578	15.05	0.452	*33*	15.64	....	..	14.89	0.530	17	14.89	....	..	15.57	....	..	14.27	78.6	13
3378.579	14.89	0.220	*09*	15.61	....	..	15.96	0.451	19	14.89	....	..	15.61	....	..	14.27	79.6	14
3380.500	15.37	0.291	23	15.47	....	..	15.47	0.214	19	14.79	....	..	15.47	....	..	14.27	81.5	19
" .602	15.37	0.393	05	15.37	....	..	15.78	0.316	19	14.94	....	..	15.42	....	..	14.22	81.6	14
3390.604	15.11	0.529	*27*	15.33	....	..	14.56	0.063	05	14.71	....	..	15.37	....	..	14.17	91.6	64
3408.568	14.66	0.610	25	15.61	....	..	15.73	0.216	45	14.83	....	..	15.73	....	..	13.73	3.6	R
3409.544	15.37	0.353	11	15.73	....	..	15.16	0.112	35	14.83	....	..	15.47	....	..	13.40	4.5	35
" .623	15.08	0.432	*29*	15.47	....	..	15.47	0.191	29	15.05	....	..	15.47	....	..	13.40	4.6	35
3411.603	15.37	0.562	18	15.42	....	..	14.22	0.012	*02*	14.83	....	..	15.78	....	..	13.35	6.6	27
3412.560	15.11	0.286	*01*	15.37	....	..	15.83	0.430	07	14.94	....	..	15.47	....	..	13.55	7.6	45
3413.569	14.27	0.061	*20*	15.47	....	..	15.78	0.359	10	14.83	....	..	15.37	....	..	13.16	8.6	03
3414.620	14.99	0.496	*40*	15.57	....	..	15.73	0.331	10	14.94	....	..	15.73	....	..	12.93	9.6	*21*
3415.489	14.71	0.131	01	15.57	....	..	14.79	0.120	*06*	14.83	....	..	15.33	....	..	13.40	10.5	24
" .531	14.94	0.173	10	15.47	....	..	14.94	0.162	*11*	14.89	....	..	15.47	....	..	13.35	10.5	19
" .572	14.89	0.214	*08*	15.42	....	..	15.21	0.203	*02*	14.79	....	..	15.42	....	..	12.98	10.6	*19*
" .614	15.21	0.256	15	15.57	....	..	15.73	0.245	34	14.66	....	..	15.73	....	..	12.98	10.6	*19*
3419.548	15.21	0.491	*18*	15.78	....	..	15.42	0.401	*32*	14.79	....	..	15.61	....	..	13.30	14.5	06
3422.494	15.08	0.353	*18*	15.11	....	..	14.76	0.109	*02*	14.89	....	..	15.47	....	..	13.35	17.5	04
" .591	14.89	0.450	*49*	15.21	....	..	15.11	0.206	*12*	14.79	....	..	15.61	....	..	12.93	17.6	*40*
3423.506	14.56	0.132	*15*	15.47	....	..	14.27	0.042	*12*	14.71	....	..	15.61	....	..	13.30	18.5	*03*
3666.649	15.83	0.320	R	15.78	....	..	15.78	0.308	21	14.76	....	..	15.73	....	..	14.22	49.6	19
3673.681	15.37	0.569	27	15.42	....	..	15.73	0.324	12	15.11	....	..	15.73	....	..	14.22	56.7	10
3693.638	14.66	0.177	*20*	15.16	....	..	15.26	0.311	*32*	14.79	....	..	*15.3*	....	..	14.22	76.6	06
3694.577	15.21	0.499	*18*	15.41	....	..	15.11	0.171	01	14.94	....	..	15.33	....	..	14.17	77.6	02
" .615	15.47	0.537	10	15.16	....	..	15.37	0.209	12	14.89	....	..	15.37	....	..	14.17	77.6	02
3695.519	14.99	0.208	05	15.27	....	..	14.76	0.033	43	14.89	....	..	15.57	....	..	14.27	78.5	14
" .561	15.08	0.250	03	15.30	....	..	14.89	0.075	31	14.94	....	..	15.57	....	..	14.17	78.6	03
" .602	15.05	0.291	*09*	15.73	....	..	14.94	0.116	11	14.89	....	..	15.73	....	..	14.17	78.6	03
" .644	15.01	0.333	*22*	15.30	....	..	15.01	0.158	*01*	14.76	....	..	15.78	....	..	14.22	78.6	08
3698.504	14.89	0.110	25	15.42	....	..	15.57	0.320	*04*	14.76	....	..	15.47	....	..	13.95	81.5	*12*
3699.499	15.21	0.488	*18*	15.78	....	..	15.73	0.235	36	14.79	....	..	15.57	....	..	13.83	82.5	*22*
" .542	15.93	0.531	55	15.61	....	..	16.10	0.278	60	14.99	....	..	15.57	....	..	14.17	82.5	*10*

J. D.	No. 45.	Per. 0d.616637		No. 46.	Per. not det'd.		No. 47.	Per. 0d.539725		No. 48.	Per. not det'd.		No. 49.	Per. not det'd.		No. 50.	Per. 106d.0	
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
3699.584	15.27	0.573	24	15.37	....	..	15.73	0.320	12	14.94	....	..	15.61	....	..	13.95	82.6	*10*
3713.513	15.05	0.320	*14*	15.37	....	..	15.27	0.216	*01*	14.94	....	..	15.61	....	..	12.93	96.5	*12*
" .680	15.11	0.487	*28*	15.21	....	..	15.57	0.383	*15*	14.73	....	..	15.73	....	..	12.88	96.7	*16*
3717.517	14.56	0.007	21	15.61	....	..	15.73	0.442	*04*	14.66	....	..	15.47	....	..	12.83	100.5	*17*
" .692	14.61	0.182	*27*	15.30	....	..	14.66	0.077	06	14.76	....	..	15.57	....	..	12.83	100.7	*17*
" .817	14.56	0.307	R	*16.0*	....	..	*16.0*	0.202	..	14.56	....	..	15.42	....	..	12.88	100.8	*12*
3724.535	14.73	0.242	*30*	15.16	....	..	15.57	0.444	*20*	14.89	....	..	15.37	....	..	12.93	1.5	*08*
" .676	15.11	0.383	*20*	15.11	....	..	14.27	0.045	*14*	14.76	....	..	15.83	....	..	13.35	1.7	34
3748.572	14.94	0.230	*06*	15.26	....	..	15.16	0.193	*01*	14.89	....	..	15.36	....	..	13.30	25.6	*22*
3775.556	14.56	0.082	02	15.37	....	..	15.27	0.191	10	14.89	....	..	15.47	....	..	13.83	52.6	*25*
3960.869	15.37	0.404	04	15.42	....	..	15.42	0.378	*29*	14.71	....	..	15.42	....	..	13.45	25.9	*08*
4014.745	14.12	0.016	*24*	15.42	....	..	....	....	..	14.89	....	..	15.73	....	..	13.40	79.7	R
4037.635	14.51	0.091	*05*	15.42	....	..	15.42	0.503	02	14.71	....	..	15.42	....	..	13.25	102.6	25
" .663	14.71	0.119	06	15.42	....	..	14.61	0.531	*09*	14.71	....	..	15.42	....	..	13.30	102.7	30
4041.675	15.22	0.431	*15*	15.42	....	..	14.99	0.225	*34*	14.79	....	..	15.32	....	..	13.35	0.7	34
4052.600	15.06	0.256	*01*	15.58	....	..	15.58	0.356	*09*	14.94	....	..	15.26	....	..	13.52	11.6	33
4058.548	14.40	0.038	00	15.58	....	..	15.73	0.367	04	14.94	....	..	15.26	....	..	13.52	17.5	20
" .662	14.99	0.152	21	15.58	....	..	15.98	0.481	26	14.89	....	..	15.21	....	..	13.52	17.7	20
" .780	15.11	0.270	02	15.73	....	..	14.61	0.059	13	14.89	....	..	15.26	....	..	13.52	17.8	19
" .854	15.21	0.344	*04*	15.58	....	..	15.06	0.133	14	14.99	....	..	15.37	....	..	13.45	17.9	13
4066.635	14.66	0.109	03	15.58	....	..	15.73	0.358	05	14.89	....	..	15.26	....	..	13.52	25.6	00
4067.636	15.21	0.493	*18*	15.73	....	..	15.26	0.280	*25*	14.89	....	..	15.37	....	..	13.52	26.6	*02*
4069.560	15.11	0.567	*02*	15.47	....	..	14.27	0.045	*13*	14.89	....	..	15.37	....	..	13.52	28.6	*08*
" .795	14.71	0.186	*18*	15.58	....	..	15.78	0.280	27	14.82	....	..	15.37	....	..	13.45	28.8	*16*
4070.655	15.16	0.429	*21*	15.42	....	..	14.40	0.060	*10*	14.89	....	..	15.26	....	..	13.52	29.6	*11*
4071.538	14.61	0.079	08	15.26	....	..	15.26	0.404	*49*	14.82	....	..	15.26	....	..	13.52	30.5	*13*
" .747	15.06	0.288	*07*	15.37	....	..	14.40	0.073	*16*	14.82	....	..	15.47	....	..	13.52	30.7	*13*
4072.538	15.21	0.462	*17*	15.26	....	..	15.26	0.324	*35*	14.89	....	..	15.42	....	..	13.52	31.5	*16*
" .745	14.40	0.052	*03*	15.26	....	..	14.66	0.531	*02*	14.89	....	..	15.47	....	..	13.73	31.7	05
4073.553	14.99	0.244	*04*	15.26	....	..	15.58	0.260	13	14.94	....	..	15.47	....	..	13.88	32.5	16
" .758	15.21	0.449	*17*	15.42	....	..	15.73	0.465	*05*	14.94	....	..	15.42	....	..	13.78	32.8	06
4074.561	14.56	0.018	20	15.47	....	..	15.11	0.188	*05*	14.99	....	..	15.37	....	..	13.78	33.6	04
4085.663	14.66	0.021	29	15.58	....	..	15.98	0.496	45	14.99	....	..	15.37	....	..	14.04	44.7	07
4086.608	14.82	0.349	*42*	15.58	....	..	15.78	0.361	09	15.06	....	..	15.47	....	..	14.04	45.6	06
4092.573	14.89	0.148	12	15.78	....	..	15.98	0.389	25	14.82	....	..	15.37	....	..	14.22	51.6	16
4093.532	15.21	0.490	*18*	15.37	....	..	15.42	0.269	*05*	14.89	....	..	15.58	....	..	14.22	52.5	14
" .762	14.56	0.104	*06*	15.37	....	..	15.98	0.499	48	15.06	....	..	15.58	....	..	14.04	52.8	*05*
4133.607	14.89	0.484	*50*	15.78	....	..	15.78	0.404	04	14.89	....	..	15.78	....	..	12.93	92.6	*50*
4147.519	14.89	0.213	*07*	15.47	....	..	15.47	0.283	*05*	14.76	....	..	15.37	....	..	12.93	0.5	*08*
4437.629	15.42	0.504	03	15.42	....	..	14.27	0.021	00	14.89	....	..	15.61	....	..	13.93	78.6	*21*
4795.632	....	....	..	15.47	....	..	15.42	0.187	27	14.71	....	..	15.42	....	..	....	....	..
4846.568	14.56	0.613	16	15.47	....	..	15.78	0.388	05	14.79	....	..	15.73	....	..	14.07	63.6	*10*
4860.582	15.47	0.444	08	15.61	....	..	15.78	0.370	08	14.94	....	..	15.42	....	..	14.27	77.6	12
4876.513	15.37	0.342	13	15.47	....	..	14.61	0.109	*17*	14.71	....	..	15.37	....	..	12.83	93.5	*47*
4886.535	....	....	..	15.42	....	..	16.15	0.416	39	14.99	....	..	15.16	....	..	12.93	103.5	*07*
5560.608	14.71	0.587	*10*	15.73	....	..	15.83	0.372	13	14.94	....	..	15.47	....	..	13.83	35.6	05
5562.605	14.89	0.117	24	15.42	....	..	15.37	0.210	12	15.05	....	..	15.37	....	..	14.12	37.6	29
5563.594	15.37	0.490	*02*	15.37	....	..	14.99	0.120	14	14.99	....	..	15.37	....	..	13.83	38.6	*01*
5579.551	15.37	0.414	01	15.37	....	..	15.61	0.425	*15*	14.89	....	..	15.37	....	..	14.17	54.6	07
5581.558	14.94	0.571	*14*	15.47	....	..	15.37	0.273	*11*	14.89	....	..	15.37	....	..	14.22	56.6	10

J. D.	No. 45. Per. 0d.616637			No. 46. Per. not det'd.			No. 47. Per. 0d.539725			No. 48. Per. not det'd.			No. 49. Per. not det'd.			No. 50. Per. 106d.0		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
5899.564	15.37	0.393	05	15.57	....	..	15.42	0.381	*30*	14.84	....	..	15.42	....	..	14.32	56.6	20
5901.555	15.42	0.534	04	15.42	....	..	15.22	0.213	*05*	14.94	....	..	15.42	....	..	14.32	58.6	18
" .646	14.27	0.008	*08*	15.42	....	..	15.42	0.304	*14*	14.71	....	..	15.57	....	..	14.07	58.6	*07*
6633.655	14.27	0.069	*23*	15.42	....	..	15.83	0.446	06	14.99	....	..	15.37	....	..	13.88	48.7	*14*
6634.509	15.42	0.306	25	15.32	....	..	14.99	0.221	*33*	14.89	....	..	15.42	....	..	14.12	49.5	09
" .566	15.42	0.363	14	15.22	....	..	15.42	0.278	*08*	14.89	....	..	15.42	....	..	13.88	49.6	*15*
" .682	14.99	0.479	*40*	15.42	....	..	15.57	0.394	*16*	14.89	....	..	15.37	....	..	14.12	49.7	08
7021.639	14.79	0.188	*10*	15.42	....	..	15.57	0.368	*12*	14.71	....	..	15.42	....	..	13.45	12.6	24
7023.629	15.12	0.328	*09*	15.42	....	..	14.89	0.199	*32*	14.71	....	..	15.42	....	..	12.98	14.6	*26*
" .678	15.57	0.377	27	15.42	....	..	14.99	0.248	*41*	14.71	....	..	15.57	....	..	13.13	14.7	*11*
8157.558	15.22	0.262	14	15.42	....	..	14.79	0.166	*27*	14.99	....	..	15.27	....	..	13.35	88.6	*45*
9533.816	14.89	0.186	00	15.57	....	..	14.71	0.125	*17*	14.89	....	..	15.42	....	..	13.99	86.8	10
" .888	15.37	0.258	30	15.42	....	..	15.22	0.197	01	14.89	....	..	15.42	....	..	13.78	86.9	*11*
" .914	15.32	0.284	19	15.57	....	..	14.99	0.223	*33*	14.99	....	..	15.42	....	..	13.88	86.9	*01*
" .947	15.42	0.317	23	15.42	....	..	15.37	0.256	*06*	15.12	....	..	15.42	....	..	13.88	86.9	*01*
9537.761	15.57	0.431	20	15.57	....	..	15.42	0.292	*11*	14.99	....	..	15.42	....	..	13.88	90.8	28
" .786	15.42	0.456	04	15.57	....	..	15.57	0.317	*03*	14.89	....	..	15.42	....	..	14.12	90.8	52
" .812	15.57	0.482	18	15.73	....	..	15.73	0.343	08	14.89	....	..	15.42	....	..	13.78	90.8	18
" .836	15.51	0.506	12	15.42	....	..	15.57	0.367	*12*	14.89	....	..	15.42	....	..	13.88	90.8	28
" .874	15.73	0.544	38	15.83	....	..	15.73	0.405	*01*	14.99	....	..	15.42	....	..	13.88	90.9	29
" .899	14.71	0.569	*39*	15.42	....	..	15.42	0.430	*34*	14.99	....	..	15.42	....	..	13.88	90.9	29
" .924	14.61	0.594	*06*	15.42	....	..	15.83	0.455	06	14.89	....	..	15.42	....	..	13.68	90.9	09
" .950	14.32	0.004	*03*	15.42	....	..	15.57	0.481	*15*	14.99	....	..	15.42	....	..	13.78	91.0	20

J. D.	No. 51. Per. not det'd.			No. 52. Per. 0d.501790			No. 53. Per. not det'd.			No. 54. Per. not det'd.			No. 55. Per. 0d.490737			No. 56. Per. 0d.534690		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
1145.794	14.17	....	..	....	....	..	13.88	....	..	13.88	....	..	....	....	..	14.14	....	..
1148.796	14.17	....	..	....	....	..	13.45	....	..	14.27	....	..	14.66	0.096	*31*	14.66	0.006	29
1155.796	14.39	....	..	....	....	..	14.56	....	..	13.83	....	..	....	....	..	14.61	0.055	*09*
1161.809	14.42	....	..	14.66	0.362	*74*	14.17	....	..	14.56	....	..	14.66	0.350	*58*	....	....	..
1174.794	14.27	....	..	....	....	..	14.17	....	..	14.17	....	..	....	....	..	....	....	..
1178.785	14.56	....	..	15.16	0.277	*21*	14.02	....	..	14.61	....	..	....	....	..	14.61	0.052	*06*
1199.701	14.27	....	..	14.66	0.118	*17*	14.22	....	..	14.45	....	..	14.61	0.455	*39*	15.06	0.115	04
3346.540	14.17	....	..	15.30	0.299	*08*	14.45	....	..	14.27	....	..	15.37	0.320	13	15.42	0.174	20
3366.544	14.27	....	..	15.11	0.232	*17*	....	....	..	15.37	....	..	15.11	0.203	*08*	15.58	0.395	*03*
3369.698	14.42	....	..	15.36	0.375	*04*	14.42	....	..	14.94	....	..	14.89	0.413	*29*	15.58	0.340	00
3370.528	14.51	....	..	15.16	0.201	*04*	14.42	....	..	15.05	....	..	15.21	0.262	*02*	15.06	0.101	10
3371.529	14.27	....	..	15.11	0.199	*08*	14.27	....	..	15.11	....	..	15.21	0.281	*03*	14.40	0.033	*15*
3374.502	14.32	....	..	14.99	0.161	*07*	14.42	....	..	14.56	....	..	15.11	0.310	*13*	15.78	0.332	20
" .538	14.42	....	..	15.16	0.197	*03*	14.56	....	..	14.56	....	..	15.37	0.346	13	15.26	0.368	*34*
3376.502	14.56	....	..	14.99	0.154	*04*	14.56	....	..	15.47	....	..	15.11	0.347	*13*	....	....	..
" .543	14.42	....	..	15.11	0.195	*08*	14.56	....	..	15.73	....	..	15.16	0.388	*06*	15.58	0.234	16
" .584	14.27	....	..	15.47	0.236	19	14.56	....	..	15.78	....	..	14.89	0.429	*24*	15.58	0.275	06
" .677	13.83	....	..	15.37	0.329	*02*	14.17	....	..	15.16	....	..	14.61	0.031	*19*	15.58	0.368	*02*
3377.578	14.61	....	..	15.37	0.226	11	14.56	....	..	15.73	....	..	14.94	0.441	*14*	15.42	0.200	11
3378.579	14.56	....	..	15.37	0.224	12	14.27	....	..	14.27	....	..	14.99	0.461	05	15.16	0.132	07
3380.500	14.61	....	..	14.89	0.138	*05*	14.56	....	..	15.47	....	..	15.08	0.419	*09*	15.58	0.449	11
" .602	14.56	....	..	15.37	0.240	08	14.89	....	..	15.37	....	..	14.89	0.030	09	14.82	0.016	40
3390.604	14.22	....	..	15.21	0.206	00	14.51	....	..	14.89	....	..	15.11	0.217	*09*	15.26	0.394	*34*

J. D.	No. 51.	Per. not det'd.		No. 52.	Per. $0^d.501790$		No. 53.	Per. not det'd.		No. 54.	Per. not det'd.		No. 55.	Per. $0^d.490737$		No. 56.	Per. $0^d.534690$	
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
3408.568	14.56	....	..	14.66	0.105	*12*	14.66	....	..	14.22	....	..	14.66	0.024	*13*	15.42	0.178	20
3409.544	14.45	....	..	14.66	0.078	04	14.42	....	..	15.21	....	..	14.66	0.019	*12*	15.06	0.085	18
" .623	14.32	....	..	14.99	0.157	*04*	14.56	....	..	15.47	....	..	14.99	0.098	00	15.47	0.164	27
3411.603	14.27	....	..	14.99	0.130	08	14.79	....	..	15.73	....	..	14.89	0.115	*15*	14.22	0.005	*15*
3412.560	14.56	....	..	14.56	0.083	*08*	14.27	....	..	15.47	....	..	14.99	0.090	01	15.98	0.427	39
3413.569	14.51	....	..	14.76	0.088	11	14.42	....	..	14.66	....	..	15.23	0.118	18	15.78	0.367	18
3414.620	14.02	....	..	15.16	0.136	23	14.66	....	..	15.21	....	..	15.37	0.187	20	15.78	0.348	19
3415.489	14.42	....	..	14.12	0.001	*12*	14.27	....	..	14.89	....	..	14.79	0.075	*14*	15.16	0.148	02
" .531	14.56	....	..	14.39	0.043	*02*	14.27	....	..	15.37	....	..	14.94	0.117	*10*	15.37	0.190	10
" .572	14.32	....	..	14.56	0.084	*08*	14.27	....	..	15.37	....	..	15.21	0.158	08	15.58	0.231	18
" .614	14.56	....	..	14.66	0.126	*23*	14.56	....	..	15.21	....	..	15.37	0.200	18	15.98	0.273	47
3419.548	14.22	....	..	14.22	0.046	*20*	14.17	....	..	14.27	....	..	15.21	0.208	02	15.58	0.464	28
3422.494	14.17	....	..	14.22	0.483	*06*	14.45	....	..	15.05	....	..	15.16	0.209	*04*	15.26	0.202	*06*
" .591	14.22	....	..	14.66	0.078	04	14.27	....	..	14.66	....	..	15.05	0.306	*19*	15.26	0.299	*28*
3423.506	14.22	....	..	14.17	0.491	*09*	14.27	....	..	15.37	....	..	15.11	0.240	*11*	14.82	0.145	*31*
3666.649	14.17	....	..	14.99	0.266	*35*	14.22	....	..	14.61	....	..	14.94	0.468	10	14.61	0.004	24
3673.681	14.27	....	..	15.42	0.273	06	14.27	....	..	15.37	....	..	14.79	0.139	*31*	14.94	0.085	06
3693.638	14.17	....	..	14.94	0.159	*10*	14.17	....	..	14.61	....	..	15.05	0.467	21	15.26	0.258	*21*
3694.577	14.02	....	..	14.79	0.094	08	14.39	....	..	14.89	....	..	15.21	0.424	04	15.22	0.128	14
" .615	14.39	....	..	14.79	0.132	*13*	14.66	....	..	14.94	....	..	14.89	0.462	*04*	15.16	0.166	*04*
3695.519	14.39	....	..	14.39	0.032	05	14.76	....	..	14.99	....	..	15.11	0.385	*11*	15.06	0.001	71
" .561	14.39	....	..	14.61	0.074	00	15.11	....	..	14.66	....	..	15.27	0.427	13	14.82	0.043	20
" .602	14.17	....	..	14.79	0.115	*04*	14.89	....	..	14.56	....	..	14.94	0.468	09	14.82	0.084	*06*
" .644	14.27	....	..	14.76	0.157	*28*	14.56	....	..	15.01	....	..	14.89	0.019	11	15.58	0.126	52
3698.504	14.39	....	..	14.42	0.007	16	14.22	....	..	14.94	....	..	15.30	0.425	15	15.78	0.312	22
3699.499	13.83	....	..	14.56	0.500	32	14.27	....	..	14.89	....	..	15.37	0.439	28	15.26	0.238	*16*
" .542	14.27	....	..	14.42	0.041	03	14.76	....	..	15.08	....	..	14.79	0.482	02	15.78	0.281	25
" .584	14.17	....	..	14.66	0.083	02	14.89	....	..	15.61	....	..	14.89	0.033	08	15.78	0.323	21
3713.513	14.02	....	..	14.79	0.464	27	14.94	....	..	14.84	....	..	15.30	0.221	10	15.16	0.350	*43*
" .680	14.27	....	..	14.89	0.129	00	13.95	....	..	14.66	....	..	14.94	0.388	*27*	14.66	0.517	21
3717.517	14.17	....	..	15.11	0.453	13	13.83	....	..	14.73	....	..	15.57	0.300	33	15.06	0.076	23
" .692	14.17	....	..	14.89	0.127	00	13.83	....	..	14.73	....	..	14.79	0.475	01	15.78	0.251	32
" .817	14.17	....	..	15.30	0.252	*03*	13.78	....	..	14.42	....	..	15.61	0.109	59	....	....	..
3724.535	14.56	....	..	15.05	0.446	*17*	14.27	....	..	15.27	....	..	14.99	0.447	*05*	15.06	0.143	*07*
" .676	14.22	....	..	14.56	0.086	*09*	14.56	....	..	14.66	....	..	15.11	0.097	13	15.58	0.284	05
3748.572	14.17	....	..	15.26	0.397	*14*	14.22	....	..	14.66	....	..	14.94	0.438	*16*	15.16	0.119	13
3775.556	14.27	....	..	15.21	0.285	*16*	14.66	....	..	15.21	....	..	14.99	0.432	*14*	15.58	0.369	*02*
3960.869	14.27	....	..	15.32	0.437	*05*	14.32	....	..	....	....	..	15.22	0.246	00	14.99	0.144	*14*
4014.745	13.88	....	..	14.71	0.120	*14*	....	....	..	....	....	..	14.94	0.141	*17*	14.71	0.017	28
4037.635	14.17	....	..	15.42	0.429	03	14.12	....	..	....	....	..	14.89	0.457	*08*	15.22	0.450	*25*
" .663	14.30	....	..	14.71	0.457	*19*	14.32	....	..	....	....	..	14.71	0.485	*05*	14.71	0.478	*42*
4041.675	....	....	..	14.71	0.455	*20*	14.17	....	..	14.51	....	..	14.71	0.080	*22*	15.37	0.212	03
4052.600	14.22	....	..	15.26	0.341	*13*	14.40	....	..	15.06	....	..	15.06	0.209	*14*	15.26	0.443	*26*
4058.548	....	....	..	15.47	0.267	13	14.56	....	..	15.37	....	..	15.06	0.268	*17*	14.61	0.510	09
" .662	14.27	....	..	15.73	0.381	33	14.61	....	..	15.98	....	..	15.06	0.382	*16*	15.06	0.089	16
" .780	14.40	....	..	14.04	0.499	*20*	14.56	....	..	15.78	....	..	14.82	0.010	06	15.37	0.207	04
4058.854	14.40	....	..	14.56	0.071	*01*	14.56	....	..	14.40	....	..	15.06	0.084	11	15.42	0.281	*10*
4066.635	14.27	....	..	15.26	0.326	*13*	14.27	....	..	14.82	....	..	14.82	0.013	06	14.61	0.042	00
4067.636	14.40	....	..	15.37	0.323	*02*	14.40	....	..	15.58	....	..	14.82	0.032	02	14.40	0.508	*15*
4069.560	14.40	....	..	15.37	0.240	08	14.27	....	..	15.42	....	..	14.99	0.484	22	15.47	0.293	*07*

J. D.	No. 51.	Per. not det'd.		No. 52.	Per. $0^d.501790$		No. 53.	Per. not det'd.		No. 54.	Per. not det'd.		No. 55.	Per. $0^d.490737$		No. 56.	Per. $0^d.534690$	
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
4069.795	14.27	....	..	14.22	0.475	*11*	14.27	....	..	14.40	....	..	15.26	0.228	05	14.27	0.528	*08*
4070.655	14.40	....	..	15.26	0.331	*13*	14.22	....	..	14.40	....	..	14.89	0.107	*13*	15.73	0.319	16
4071.538	14.40	....	..	15.06	0.211	*17*	14.04	....	..	14.66	....	..	14.82	0.008	06	15.04	0.132	*03*
" .747	14.40	....	..	15.58	0.420	18	14.40	....	..	15.26	....	..	15.26	0.217	06	15.58	0.341	00
4072.538	14.40	....	..	15.06	0.207	*16*	14.27	....	..	14.56	....	..	14.89	0.027	09	14.71	0.063	*05*
" .745	14.22	....	..	15.26	0.414	*14*	14.27	....	..	....	....	..	15.11	0.234	*11*	15.37	0.270	*13*
4073.553	14.27	....	..	15.26	0.219	01	14.27	....	..	15.26	....	..	14.66	0.060	*22*	14.40	0.009	01
" .758	14.22	....	..	15.42	0.424	03	14.04	....	..	15.58	....	..	15.16	0.265	*07*	15.26	0.214	*09*
4074.561	14.40	....	..	15.11	0.223	*15*	14.04	....	..	15.26	....	..	14.82	0.087	*14*	14.99	0.482	*06*
4085.663	14.40	....	..	15.47	0.286	10	14.27	....	..	14.66	....	..	14.94	0.393	*27*	15.73	0.356	14
4086.608	....	....	..	15.47	0.227	20	....	....	..	....	....	..	15.06	0.356	*17*	15.42	0.231	02
4092.573	14.40	....	..	15.16	0.171	06	14.27	....	..	15.26	....	..	14.99	0.432	*14*	15.58	0.315	01
4093.532	14.40	....	..	14.82	0.126	*07*	14.04	....	..	15.06	....	..	15.16	0.410	*02*	15.58	0.204	25
" .762	14.40	....	..	15.26	0.356	*14*	14.82	....	..	....	....	..	15.06	0.149	*07*	15.58	0.434	00
4133.607	14.12	....	..	14.27	0.058	*22*	14.12	....	..	....	....	..	15.21	0.245	*01*	15.42	0.177	19
4147.519	14.51	....	..	15.47	0.421	07	14.56	....	..	15.47	....	..	14.89	0.416	*28*	15.16	0.187	*10*
4437.629	14.17	....	..	13.93	0.497	*32*	14.22	....	..	14.56	....	..	14.99	0.010	23	14.56	0.496	*26*
4795.632	....	....	..	15.6	0.222	..	....	....	..	....	....	..	15.42	0.265	19	15.47	0.256	00
4846.568	14.22	....	..	14.12	0.477	*20*	14.51	....	..	15.47	....	..	15.37	0.165	23	15.47	0.397	*13*
4860.582	14.56	....	..	15.78	0.441	45	14.61	....	..	15.78	....	..	14.89	0.438	*21*	14.66	0.509	14
4876.513	14.17	....	..	15.47	0.315	09	14.51	....	..	14.99	....	..	15.21	0.175	06	15.47	0.399	*13*
4886.535	....	....	..	15.42	0.301	05	....	....	..	....	....	..	14.99	0.382	*23*	15.42	0.262	*07*
5560.608	14.56	....	..	14.42	0.470	03	14.66	....	..	14.66	....	..	14.99	0.182	*18*	14.71	0.091	*19*
5562.605	14.32	....	..	14.89	0.460	17	14.66	....	..	15.42	....	..	15.16	0.216	*04*	15.21	0.484	18
5563.594	14.27	....	..	15.47	0.445	27	14.94	....	..	15.47	....	..	15.37	0.224	16	15.93	0.403	33
5579.551	14.32	....	..	15.37	0.345	*03*	14.17	....	..	14.89	....	..	14.66	0.477	*13*	15.47	0.320	*10*
5581.558	14.51	....	..	15.21	0.345	*19*	14.56	....	..	14.89	....	..	14.66	0.031	*15*	15.21	0.188	*06*
5899.564	14.27	....	..	15.42	0.216	18	14.32	....	..	15.42	....	..	14.71	0.039	*11*	14.71	0.053	02
5901.555	14.32	....	..	15.15	0.200	*05*	14.51	....	..	15.42	....	..	14.84	0.067	*07*	15.73	0.440	19
" .646	14.34	....	..	15.42	0.291	05	14.32	....	..	13.88	....	..	15.22	0.158	09	14.02	0.531	*33*
6633.655	14.12	....	..	15.42	0.188	27	....	....	..	14.12	....	..	14.71	0.478	*08*	14.71	0.015	29
6634.509	14.17	....	..	14.32	0.038	*05*	14.42	....	..	14.66	....	..	15.42	0.351	18	15.42	0.334	*16*
" .566	14.07	....	..	14.61	0.095	*11*	14.32	....	..	14.17	....	..	15.32	0.408	14	15.42	0.391	*18*
" .682	13.93	....	..	15.42	0.211	19	14.32	....	..	....	....	..	14.71	0.033	*10*	14.89	0.507	34
7021.639	14.17	....	..	15.42	0.288	05	14.32	....	..	....	....	..	15.42	0.289	18	15.83	0.349	24
7023.629	14.27	....	..	15.42	0.271	06	14.32	....	..	....	....	..	15.42	0.316	18	15.12	0.200	*19*
" .678	14.17	....	..	15.42	0.320	03	14.51	....	..	....	....	..	15.22	0.365	*01*	15.37	0.249	*09*
8157.558	14.17	....	..	14.99	0.155	*04*	14.61	....	..	....	....	..	15.22	0.152	09	14.51	0.051	*17*
9533.816	14.02	....	..	14.51	0.003	26	14.71	....	..	16.10	....	..	15.12	0.384	*10*	14.71	0.017	28
" .888	14.39	....	..	14.99	0.075	37	14.89	....	..	15.83	....	..	14.99	0.456	00	14.71	0.089	*19*
" .914	14.32	....	..	14.79	0.101	03	14.32	....	..	15.73	....	..	14.99	0.482	22	14.89	0.115	*13*
" .947	14.22	....	..	15.42	0.134	49	14.42	....	..	15.83	....	..	14.99	0.024	20	14.99	0.148	*15*
9537.761	14.22	....	..	15.83	0.435	45	14.32	....	..	15.22	....	..	15.22	0.403	03	15.32	0.220	*05*
" .786	14.22	....	..	14.99	0.460	26	14.42	....	..	15.42	....	..	14.89	0.428	*25*	15.32	0.245	*12*
" .812	14.32	....	..	14.42	0.486	14	14.61	....	..	15.50	....	..	14.89	0.454	*11*	15.42	0.271	*08*
" .836	14.22	....	..	14.51	0.008	25	14.71	....	..	15.42	....	..	14.89	0.478	10	15.32	0.295	*22*
" .874	14.22	....	..	14.71	0.046	28	14.51	....	..	15.83	....	..	14.99	0.025	19	15.73	0.333	15
" .899	14.22	....	..	14.71	0.071	13	14.71	....	..	15.73	....	..	14.99	0.050	14	15.73	0.358	14
" .924	14.22	....	..	15.12	0.096	41	14.89	....	..	15.73	....	..	15.22	0.075	29	15.42	0.383	*18*
" .950	14.32	....	..	14.99	0.122	12	14.71	....	..	15.73	....	..	15.42	0.101	42	15.73	0.409	13

J. D.	No. 57.	Per. not det'd.		No. 58.	Per. o^d.491580		No. 59.	Per. o^d.542025		No. 60.	Per. not det'd.		No. 61.	Per. o^d.568613		No. 62.	Per. o^d.562815	
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
1145.794	14.61	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
1148.796	14.66	....	..	14.02	0.488	*14*	....	....	..	....	....	..	....	....	..	14.58	0.001	*12*
1155.796	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
1161.809	14.94	....	..	15.16	0.228	*23*	....	....	..	14.66	....	..	....	....	..	14.88	0.069	12
1174.794	14.66	....	..	....	....	..	....	....	..	14.45	....	..	....	....	..	14.71	0.110	*20*
1178.785	14.66	....	..	14.66	0.490	52	14.82	0.514	00	14.56	....	..	....	....	..	....	....	..
1199.701	14.94	....	..	15.36	0.268	*10*	....	....	..	14.66	....	..	14.89	0.051	25	....	....	..
3346.540	14.56	....	..	15.73	0.377	17	15.37	0.169	24	15.37	....	..	15.37	0.376	*16*	15.40	0.515	27
3366.544	15.37	....	..	15.57	0.227	18	14.79	0.118	*12*	14.79	....	..	15.73	0.478	23	15.32	0.258	10
3369.698	14.89	....	..	....	....	..	14.17	0.020	*16*	14.56	....	..	....	....	..	14.66	0.035	*06*
3370.528	15.30	....	..	15.33	0.278	*15*	15.30	0.308	*10*	14.89	....	..	15.47	0.482	00	14.86	0.302	09
3371.529	14.66	....	..	15.30	0.296	*21*	15.21	0.224	*08*	14.79	....	..	15.47	0.346	*06*	15.16	0.178	*07*
3374.502	15.37	....	..	15.08	0.319	*45*	15.21	0.487	*12*	15.21	....	..	15.61	0.476	10	14.76	0.336	03
" .538	15.01	....	..	....	....	..	14.42	0.523	*19*	14.66	....	..	15.05	0.512	05	14.74	0.372	*10*
3376.502	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	14.66	0.085	*14*
" .543	15.47	....	..	15.16	0.394	*37*	15.30	0.360	*12*	14.94	....	..	15.73	0.242	30	14.92	0.126	*05*
" .584	15.21	....	..	14.89	0.435	*24*	15.37	0.401	*07*	15.11	....	..	15.61	0.283	13	15.16	0.167	*02*
" .677	14.56	....	..	14.56	0.036	25	15.21	0.494	*02*	15.16	....	..	15.42	0.376	*11*	....	....	..
3377.578	14.99	....	..	14.94	0.446	01	15.37	0.311	*02*	15.27	....	..	15.08	0.140	01	14.61	0.036	*11*
3378.579	15.47	....	..	14.39	0.464	*16*	15.42	0.228	12	14.71	....	..	14.39	0.004	*07*	15.40	0.474	07
3380.500	15.37	....	..	15.21	0.418	*17*	14.66	0.523	06	15.32	....	..	15.42	0.219	06	14.92	0.144	*14*
" .602	14.89	....	..	14.94	0.029	68	14.89	0.083	15	14.66	....	..	15.47	0.321	*05*	15.40	0.246	11
3390.604	14.56	....	..	15.11	0.199	*22*	15.21	0.329	*19*	14.89	....	..	14.89	0.088	07	15.02	0.117	09
3408.568	14.66	....	..	14.56	0.466	02	15.73	0.406	29	14.71	....	..	15.27	0.425	*26*	14.64	0.071	*13*
3409.544	15.47	....	..	14.66	0.459	00	15.27	0.298	*11*	15.47	....	..	15.27	0.264	*20*	15.12	0.484	*18*
" .623	15.37	....	..	14.27	0.047	*14*	15.42	0.377	00	15.37	....	..	15.73	0.343	20	14.92	0.000	22
3411.603	15.47	....	..	14.39	0.060	*14*	15.37	0.189	18	15.47	....	..	14.89	0.048	26	14.74	0.292	*09*
3412.560	14.99	....	..	14.17	0.034	*13*	14.56	0.062	*06*	14.66	....	..	15.27	0.437	*26*	14.92	0.123	*05*
3413.569	15.37	....	..	14.27	0.060	*26*	14.56	0.529	08	15.30	....	..	15.37	0.309	*14*	14.98	0.006	28
3414.620	14.61	....	..	15.11	0.128	04	15.37	0.496	15	15.37	....	..	15.30	0.222	*08*	15.16	0.495	*09*
3415.489	14.94	....	..	13.88	0.014	*26*	15.37	0.280	00	15.16	....	..	14.71	0.523	*11*	15.26	0.238	*07*
" .531	15.37	....	..	14.45	0.056	*03*	15.30	0.322	*08*	15.27	....	..	14.27	0.565	*19*	15.10	0.280	18
" .572	15.37	....	..	14.99	0.097	15	15.37	0.363	*06*	15.27	....	..	14.66	0.037	08	14.61	0.321	*12*
" .614	15.11	....	..	15.73	0.139	R	15.73	0.405	29	15.08	....	..	15.01	0.079	23	14.66	0.363	*15*
3419.548	15.42	....	..	15.05	0.140	*08*	14.17	0.003	*09*	15.11	....	..	14.51	0.033	*05*	14.74	0.357	*04*
3422.494	14.61	....	..	14.99	0.136	*13*	15.27	0.239	*05*	14.61	....	..	14.89	0.136	*15*	15.24	0.489	*04*
" .591	14.79	....	..	15.42	0.234	02	15.47	0.336	07	14.66	....	..	15.47	0.233	06	14.68	0.023	*03*
3423.506	14.89	....	..	15.27	0.165	04	14.89	0.167	*22*	14.99	....	..	14.32	0.011	*16*	14.74	0.376	*12*
3666.649	14.66	....	..	14.79	0.468	29	15.30	0.483	*08*	14.66	....	..	15.78	0.356	25	14.85	0.383	*06*
3673.681	15.16	....	..	14.56	0.126	*47*	15.47	0.469	05	15.16	....	..	14.27	0.564	*19*	14.66	0.098	*19*
3693.638	14.89	....	..	*15.3*	0.420	..	*15.3*	0.371	..	14.61	....	..	14.66	0.051	02	14.64	0.356	*14*
3694.577	14.76	....	..	15.96	0.376	40	15.16	0.226	*14*	15.16	....	..	15.21	0.422	*32*	15.24	0.170	04
" .615	14.76	....	..	15.78	0.414	36	15.37	0.264	00	14.76	....	..	15.93	0.460	40	15.52	0.208	18
3695.519	14.56	....	..	15.78	0.335	23	14.99	0.084	26	14.89	....	..	15.37	0.227	*02*	15.18	0.549	38
" .561	14.94	....	..	15.57	0.377	01	14.99	0.126	04	14.94	....	..	15.57	0.269	10	14.88	0.028	17
" .602	14.99	....	..	15.73	0.418	33	15.27	0.167	15	15.08	....	..	15.73	0.310	22	14.90	0.069	14
" .644	15.05	....	..	15.08	0.460	44	15.30	0.209	06	15.21	....	..	15.78	0.352	25	14.80	0.111	*11*
3698.504	14.73	....	..	15.30	0.370	*26*	15.42	0.358	01	14.89	....	..	15.47	0.368	*06*	15.02	0.157	*11*
3699.499	14.66	....	..	15.30	0.382	*24*	15.37	0.269	00	14.99	....	..	15.73	0.226	34	14.80	0.026	09
" .542	14.99	....	..	15.57	0.425	29	15.61	0.312	22	14.89	....	..	15.57	0.269	10	14.75	0.069	*01*

J. D.	No. 57. Per. not det'd.			No. 58. Per. $0^d.491580$			No. 59. Per. $0^d.542025$			No. 60. Per. not det'd.			No. 61. Per. $0^d.568613$			No. 62. Per. $0^d.562815$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
3699.584	15.05	....	..	14.79	0.467	29	15.61	0.354	19	15.42	....	..	15.61	0.311	10	14.88	0.111	*03*
3713.513	14.66	....	..	15.05	0.140	*08*	15.42	0.191	22	14.56	....	..	14.73	0.025	20	15.32	0.533	39
" .680	14.94	....	..	15.73	0.307	20	15.73	0.358	30	14.89	....	..	15.11	0.192	*15*	15.08	0.137	05
3717.517	14.76	....	..	15.37	0.212	00	15.37	0.401	*06*	14.79	....	..	14.76	0.049	12	14.85	0.034	13
" .692	14.39	....	..	15.83	0.386	28	14.56	0.034	14	14.61	....	..	15.47	0.224	08	15.55	0.209	21
" .817	14.61	....	..	14.39	0.020	22	15.42	0.158	33	15.05	....	..	15.42	0.349	*11*	14.78	0.334	05
3724.535	14.66	....	..	15.30	0.347	*26*	15.37	0.372	*06*	14.56	....	..	15.42	0.243	*01*	14.94	0.299	15
" .676	15.21	....	..	14.22	0.488	06	14.79	0.513	*01*	14.99	....	..	15.68	0.384	15	15.14	0.440	*15*
3748.572	14.66	....	..	*15.3*	0.297	..	14.27	0.018	*05*	14.66	....	..	*15.0*	0.399	..	15.04	0.135	01
3775.556	14.66	....	..	15.37	0.244	*06*	15.37	0.443	*07*	15.21	....	..	14.89	0.089	07	15.06	0.103	18
3960.869	14.51	....	..	15.78	0.231	37	15.42	0.383	*01*	....	....	..	14.71	0.034	15	15.32	0.250	05
4014.745	....	....	..	14.51	0.034	22	14.71	0.057	14	....	....	..	15.42	0.461	*11*	14.99	0.096	15
4037.635	....	....	..	15.42	0.311	*11*	15.32	0.182	15	15.27	....	..	14.71	0.038	11	15.22	0.473	*10*
" .663	14.51	....	..	15.6	0.339	..	....	....	..	....	....	..	14.71	0.066	00	14.99	0.501	*23*
4041.675	14.71	....	..	15.42	0.418	03	15.42	0.428	*02*	15.12	....	..	14.96	0.097	09	14.71	0.011	01
4052.600	15.06	....	..	14.56	0.037	24	14.66	0.512	*17*	14.61	....	..	15.26	0.219	*11*	15.34	0.242	03
4058.548	14.82	....	..	14.71	0.086	*03*	15.37	0.498	19	14.94	....	..	15.42	0.480	*07*	14.94	0.562	23
" .662	15.26	....	..	15.06	0.200	*28*	14.40	0.070	*25*	15.06	....	..	14.66	0.026	13	14.88	0.113	*04*
" .780	14.82	....	..	15.42	0.318	*11*	15.06	0.188	*12*	15.26	....	..	15.06	0.144	*02*	15.34	0.231	00
4058.854	15.06	....	..	15.26	0.392	*27*	15.37	0.262	00	14.66	....	..	15.26	0.218	*11*	14.68	0.305	*09*
4066.635	15.11	....	..	15.58	0.308	05	15.37	0.454	*07*	14.66	....	..	14.61	0.038	02	15.34	0.207	00
4067.636	14.82	....	..	15.98	0.326	44	15.26	0.371	*17*	15.06	....	..	15.58	0.471	06	14.88	0.082	07
4069.560	14.71	....	..	15.98	0.283	50	14.66	0.127	*31*	15.06	....	..	15.06	0.120	09	14.66	0.318	*07*
" .795	14.89	....	..	14.22	0.027	*01*	15.26	0.362	*16*	15.04	....	..	15.47	0.355	*06*	14.98	0.553	23
4070.655	15.06	....	..	15.98	0.395	45	14.89	0.138	*11*	14.82	....	..	14.82	0.078	04	14.82	0.287	*02*
4071.538	14.84	....	..	15.73	0.295	22	15.26	0.479	*12*	14.99	....	..	15.16	0.392	*37*	14.61	0.045	*12*
" .747	15.11	....	..	14.04	0.012	*10*	14.82	0.146	*21*	14.82	....	..	14.56	0.033	00	15.34	0.254	11
4072.538	14.82	....	..	15.98	0.312	45	15.26	0.395	*18*	14.61	....	..	15.26	0.255	*19*	15.34	0.482	03
" .745	14.66	....	..	14.27	0.027	03	14.56	0.060	*04*	14.82	....	..	15.58	0.462	05	14.96	0.126	*01*
4073.553	14.66	....	..	15.83	0.344	27	15.26	0.326	*13*	15.06	....	..	14.84	0.133	*19*	14.82	0.371	*01*
" .758	15.06	....	..	14.40	0.057	*10*	14.40	0.531	00	14.82	....	..	15.37	0.338	*16*	14.86	0.013	15
4074.561	15.06	....	..	15.73	0.368	17	15.11	0.250	*23*	14.40	....	..	14.40	0.004	*06*	15.58	0.254	35
4085.663	15.06	....	..	15.11	0.164	*12*	14.66	0.512	*17*	14.82	....	..	15.26	0.302	*24*	15.06	0.099	20
4086.608	....	....	..	15.06	0.126	00	15.37	0.372	*06*	....	....	..	14.82	0.110	*12*	15.26	0.482	*05*
4092.573	15.06	....	..	15.21	0.192	*11*	15.26	0.375	*17*	14.82	....	..	15.26	0.389	*27*	15.26	0.256	00
4093.532	14.82	....	..	15.26	0.168	02	15.21	0.250	*13*	15.11	....	..	15.21	0.210	*13*	14.82	0.089	*01*
" .762	....	....	..	15.06	0.398	*47*	15.26	0.480	*11*	....	....	..	15.26	0.440	*27*	14.61	0.319	*12*
4133.607	14.66	....	..	15.88	0.425	58	15.21	0.215	*05*	14.61	....	..	15.83	0.483	36	15.21	0.204	*12*
4147.519	15.47	....	..	14.61	0.081	*12*	14.66	0.035	22	14.99	....	..	14.99	0.179	*24*	14.66	0.046	*07*
4437.629	14.89	....	..	15.21	0.159	00	14.99	0.161	*10*	14.66	....	..	15.42	0.297	*07*	14.86	0.306	10
4795.632	....	....	..	15.47	0.292	*03*	15.47	0.428	03	....	....	..	14.66	0.073	*08*	14.64	0.359	*15*
4846.568	14.66	....	..	15.11	0.103	21	15.37	0.413	*07*	15.21	....	..	15.78	0.403	25	14.71	0.078	*08*
4860.582	15.37	....	..	15.47	0.353	*09*	15.47	0.335	07	15.37	....	..	15.37	0.202	06	14.58	0.022	*13*
4876.513	15.16	....	..	14.89	0.062	35	14.32	0.005	06	15.37	....	..	15.47	0.211	13	15.37	0.194	07
4886.535	....	....	..	15.42	0.252	*01*	15.42	0.271	05	....	....	..	14.61	0.567	17	14.74	0.086	*07*
5560.608	14.71	....	..	15.78	0.369	*22*	14.89	0.064	26	14.89	....	..	15.57	0.265	09	15.40	0.469	07
5562.605	15.21	....	..	15.47	0.400	*04*	15.37	0.435	*07*	15.11	....	..	14.56	0.556	07	15.16	0.215	*19*
5563.594	14.99	....	..	15.42	0.406	*06*	15.42	0.340	02	14.99	....	..	15.47	0.408	*06*	14.90	0.078	12
5579.551	14.89	....	..	14.99	0.140	*14*	14.56	0.037	13	14.66	....	..	15.83	0.444	30	14.76	0.276	*22*
5581.558	14.66	....	..	15.47	0.181	19	15.37	0.418	*07*	14.99	....	..	15.37	0.176	16	14.71	0.032	*01*

J. D.	No. 57. Per. not det'd.			No. 58. Per. $0^d.491580$			No. 59. Per. $0^d.542025$			No. 60. Per. not det'd.			No. 61. Per. $0^d.568613$			No. 62. Per. $0^d.562815$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
5899.564	14.89	....	..	14.99	0.135	*13*	15.42	0.255	06	14.79	....	..	15.42	0.328	*10*	14.94	0.048	21
5901.555	14.71	....	..	15.22	0.160	00	14.71	0.078	02	14.76	....	..	14.71	0.044	09	14.99	0.350	24
" .646	14.66	....	..	15.54	0.251	11	15.32	0.169	20	15.22	....	..	15.04	0.135	00	15.50	0.441	20
6633.655	....	....	..	15.27	0.297	*25*	15.57	0.444	13	....	....	..	15.42	0.339	*10*	14.84	0.228	*51*
6634.509	14.99	....	..	15.32	0.168	08	15.37	0.214	10	15.22	....	..	14.76	0.056	09	14.94	0.519	*15*
" .566	15.22	....	..	15.42	0.225	03	15.42	0.271	05	14.51	....	..	15.04	0.113	09	14.64	0.013	*06*
" .682	14.56	....	..	15.32	0.341	*24*	15.27	0.387	*16*	14.99	....	..	15.57	0.229	17	15.06	0.129	07
7021.639	14.61	....	..	15.42	0.424	13	15.42	0.338	02	14.61	....	..	14.84	0.529	11	15.42	0.432	16
7023.629	14.71	....	..	14.66	0.448	*26*	15.12	0.160	04	14.51	....	..	15.42	0.245	*01*	15.40	0.171	19
" .678	14.71	....	..	14.46	0.005	35	15.32	0.209	07	14.56	....	..	15.42	0.294	*07*	15.42	0.220	06
8157.558	14.66	....	..	15.42	0.302	*10*	14.99	0.173	*14*	14.89	....	..	15.57	0.359	04	14.68	0.028	*03*
9533.816	15.32	....	..	15.37	0.136	25	15.37	0.229	08	14.89	....	..	14.56	0.005	09	15.42	0.203	09
" .888	15.32	....	..	15.42	0.208	08	15.42	0.301	03	15.37	....	..	14.79	0.077	01	14.75	0.275	*24*
" .914	15.16	....	..	....	....	..	15.42	0.327	02	15.22	....	..	15.17	0.103	27	14.89	0.301	11
" .947	14.71	....	..	15.42	0.267	*04*	15.42	0.360	00	15.42	....	..	14.89	0.136	*17*	14.68	0.334	*04*
9537.761	14.99	....	..	15.27	0.148	11	15.37	0.380	*06*	14.71	....	..	14.71	0.539	08	15.34	0.208	00
" .786	15.12	....	..	15.22	0.173	*04*	15.54	0.405	10	14.89	....	..	14.61	0.564	16	15.16	0.233	*18*
" .812	15.22	....	..	15.37	0.199	04	15.73	0.431	29	14.99	....	..	14.51	0.021	*01*	15.10	0.259	*10*
" .836	15.22	....	..	15.42	0.223	03	15.54	0.455	10	14.89	....	..	14.71	0.045	09	14.71	0.283	*17*
" .874	15.37	....	..	15.22	0.261	*22*	15.73	0.493	48	15.37	....	..	14.89	0.083	08	14.68	0.321	*05*
" .899	15.32	....	..	15.42	0.286	*07*	14.71	0.518	*02*	15.42	....	..	14.99	0.108	07	14.68	0.346	*06*
" .924	14.89	....	..	15.22	0.311	*31*	14.51	0.001	25	15.42	....	..	14.99	0.133	*03*	14.84	0.371	00
" .950	14.71	....	..	15.42	0.337	*14*	14.66	0.027	29	15.22	....	..	15.12	0.159	*01*	14.99	0.397	*01*

J. D.	No. 63. Per. $0^d.497677$			No. 64. Per. $0^d.544510$			No. 65. Per. $0^d.480665$			No. 66. Per. $0^d.702102$			No. 67. Per. not det'd.			No. 68. Per. $0^d.502136$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
1145.794	....	....	..	*14.5*	0.071	..	*14.2*	0.339	..	....	....	..	*14.5*	....	..	*14.5*	0.062	..
1148.796	....	....	..	*15.0*	0.351	..	14.8	0.457	..	14.66	0.046	*04*	14.27	....	..	*15.0*	0.052	..
1155.796	....	....	..	*14.9*	0.272	..	14.8	0.247	..	14.66	0.025	*04*	14.61	....	..	*14.9*	0.022	..
1161.809	....	....	..	*15.3*	0.296	..	14.66	0.011	30	14.66	0.421	*08*	14.66	....	..	14.66	0.009	*10*
1174.794	....	....	..	14.8	0.212	..	*14.9*	0.018	..	*14.9*	0.066	..	*14.9*	....	..	*14.9*	0.441	..
1178.785	....	....	..	*15.1*	0.392	..	14.61	0.164	*28*	*15.1*	0.547	..	14.27	....	..	*14.9*	0.415	..
1199.701	14.66	0.449	*28*	14.94	0.072	21	14.66	0.411	*85*	14.45	0.400	*26*	14.32	....	..	15.3	0.241	..
3346.540	15.83	0.309	29	15.61	0.453	*09*	*16.0*	0.120	..	15.12	0.211	*03*	15.11	....	..	15.34	0.448	46
3366.544	15.47	0.406	*07*	15.73	0.310	10	15.11	0.416	*39*	15.42	0.556	32	14.66	....	..	15.36	0.367	16
3369.698	15.16	0.076	50	*15.3*	0.197	..	*15.3*	0.206	..	*15.6*	0.199	..	14.17	....	..	15.02	0.006	27
3370.528	15.78	0.409	25	15.21	0.482	*40*	14.51	0.074	06	14.96	0.327	22	14.66	....	..	15.36	0.334	12
3371.529	15.61	0.414	11	15.47	0.394	*23*	14.61	0.114	*02*	15.34	0.626	31	14.27	....	..	15.32	0.331	08
3374.502	15.37	0.401	*17*	14.99	0.100	09	15.21	0.203	14	14.80	0.089	03	14.71	....	..	15.24	0.291	05
" .538	15.21	0.437	02	14.99	0.136	*13*	15.3	0.239	..	14.71	0.125	*18*	14.56	....	..	*15.0*	0.327	..
3376.502	....	....	..	15.93	0.467	24	15.42	0.280	05	14.94	0.684	21	14.89	....	..	15.16	0.282	*02*
" .543	15.11	0.451	21	14.89	0.508	04	15.37	0.321	*11*	14.61	0.023	*09*	14.99	....	..	15.08	0.323	*15*
" .584	14.51	0.492	20	14.42	0.004	01	15.27	0.362	*24*	14.66	0.064	*06*	14.66	....	..	15.18	0.364	*04*
" .677	14.66	0.088	*10*	14.66	0.097	*23*	14.61	0.455	*09*	14.74	0.157	*24*	14.17	....	..	14.58	0.457	*26*
3377.578	14.27	0.491	*05*	15.73	0.453	03	15.11	0.395	*41*	14.71	0.356	01	14.89	....	..	15.16	0.354	*07*
3378.579	14.32	0.497	04	15.47	0.365	*21*	15.16	0.435	*20*	15.02	0.655	14	14.66	....	..	15.14	0.351	*09*
3380.500	15.73	0.427	39	14.99	0.108	04	15.64	0.433	24	14.96	0.470	09	14.27	....	..	14.98	0.263	*18*
" .602	14.27	0.031	*10*	15.47	0.210	01	....	....	..	15.12	0.572	00	*16.0*	....	..	15.02	0.365	*20*
3390.604	14.66	0.080	*05*	*16.0*	0.411	..	15.21	0.443	00	14.86	0.042	16	14.56	....	..	15.21	0.324	*02*

J. D.	No. 63. Per. $0^d.497677$			No. 64. Per. $0^d.544510$			No. 65. Per. $0^d.480665$			No. 66. Per. $0^d.702102$			No. 67. Per. not det'd.			No. 68. Per. $0^d.502136$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
3408.568	15.11	0.127	07	15.47	0.406	*23*	14.99	0.142	23	15.00	0.454	19	14.56	....	..	14.80	0.212	*28*
3409.544	14.99	0.108	08	15.37	0.293	*25*	14.99	0.157	16	14.68	0.026	*02*	14.27	....	..	14.80	0.183	*23*
" .623	15.47	0.187	10	15.37	0.372	*32*	*16.0*	0.236	..	14.88	0.105	06	14.66	....	..	14.96	0.262	*20*
3411.603	15.42	0.176	11	15.42	0.174	09	15.42	0.293	02	14.66	0.680	*08*	14.22	....	..	14.86	0.234	*26*
3412.560	15.37	0.138	27	14.66	0.042	10	15.47	0.289	08	15.21	0.233	03	14.66	....	..	15.22	0.186	19
3413.569	15.27	0.152	07	14.99	0.507	14	15.47	0.336	*02*	15.12	0.540	03	14.66	....	..	14.86	0.191	*18*
3414.620	15.37	0.207	*06*	15.47	0.469	*22*	15.42	0.426	*05*	15.10	0.187	01	14.61	....	..	15.02	0.238	*10*
3415.489	14.99	0.081	27	15.78	0.249	25	15.78	0.334	29	14.74	0.354	04	14.56	....	..	14.86	0.103	*03*
" .531	15.11	0.123	09	15.57	0.291	*04*	15.47	0.376	*04*	14.86	0.396	15	14.76	....	..	14.66	0.145	*31*
" .572	15.37	0.164	11	15.78	0.332	12	15.83	0.417	33	14.82	0.437	04	14.71	....	..	15.06	0.186	03
" .614	15.37	0.206	*05*	15.21	0.374	*48*	15.57	0.459	97	15.02	0.479	11	14.79	....	..	15.00	0.228	*11*
3419.548	15.21	0.159	*01*	15.21	0.496	01	14.17	0.067	*26*	15.24	0.200	11	14.89	....	..	14.96	0.145	00
3422.494	15.21	0.119	22	16.0	0.175	..	14.66	0.129	*05*	14.90	0.338	18	14.51	....	..	14.89	0.078	05
" .591	....	....	..	16.0	0.272	..	14.94	0.226	*24*	14.78	0.435	00	15.16	....	..	15.00	0.175	*02*
3423.506	15.21	0.135	12	14.99	0.098	09	14.99	0.179	*04*	14.90	0.648	*02*	14.32	....	..	14.72	0.085	*13*
3666.649	15.78	0.412	27	16.0	0.390	..	*15.6*	0.106	..	14.99	0.161	*02*	14.94	....	..	15.05	0.195	00
3673.681	14.79	0.476	22	15.47	0.343	*20*	15.11	0.408	*40*	14.80	0.172	*23*	14.45	....	..	14.86	0.197	*20*
3693.638	14.56	0.029	21	15.26	0.153	05	15.3	0.177	..	14.68	0.470	*19*	14.32	....	..	14.76	0.068	*07*
3694.577	14.61	0.470	*02*	14.61	0.003	21	15.16	0.155	34	14.94	0.005	23	15.21	....	..	14.66	0.003	*09*
" .615	14.61	0.010	34	14.66	0.041	12	14.89	0.193	*14*	14.71	0.043	01	14.71	....	..	14.76	0.041	*03*
3695.519	15.64	0.417	16	15.33	0.401	*37*	14.66	0.136	*07*	15.47	0.245	30	14.66	....	..	15.21	0.443	32
" .561	14.66	0.459	*14*	15.83	0.443	13	14.89	0.178	*05*	14.99	0.287	02	14.99	....	..	14.94	0.485	16
" .602	14.61	0.002	37	15.73	0.484	19	14.99	0.219	*15*	14.89	0.328	15	14.94	....	..	14.71	0.024	*06*
" .644	14.79	0.044	35	14.51	0.526	07	15.73	0.261	41	14.56	0.370	*13*	14.94	....	..	14.89	0.066	06
3698.504	15.78	0.415	28	14.89	0.119	*12*	*15.2*	0.237	..	14.66	0.422	*08*	14.27	....	..	14.94	0.415	*08*
3699.499	15.61	0.415	11	14.56	0.025	10	14.99	0.271	*35*	14.66	0.012	*05*	14.66	....	..	14.99	0.406	*09*
" .542	14.66	0.458	*16*	14.66	0.068	*04*	15.78	0.314	31	14.66	0.055	*04*	14.56	....	..	14.71	0.449	*15*
" .584	14.56	0.002	32	15.01	0.110	04	15.47	0.356	*03*	14.66	0.097	*14*	14.27	....	..	14.66	0.491	*11*
3713.513	14.56	0.494	26	15.83	0.426	13	14.89	0.345	*60*	14.66	0.686	*07*	14.56	....	..	15.27	0.360	05
" .680	15.21	0.163	*03*	14.66	0.048	08	14.17	0.032	*21*	15.11	0.151	14	14.89	....	..	14.89	0.025	12
3717.517	14.27	0.019	*04*	14.79	0.074	02	14.22	0.023	*16*	14.99	0.478	09	14.66	....	..	15.37	0.347	14
" .692	15.61	0.194	22	15.42	0.249	*11*	14.76	0.198	*27*	14.99	0.653	10	14.66	....	..	14.99	0.020	23
" .817	15.16	0.319	*40*	*15.3*	0.374	..	15.3	0.323	..	14.66	0.076	*07*	14.27	....	..	15.3	0.145	..
3724.535	14.66	0.070	03	14.66	0.013	23	14.99	0.312	*48*	14.99	0.475	09	15.32	....	..	15.44	0.335	21
" .676	15.37	0.211	*06*	15.30	0.154	08	14.89	0.453	04	15.14	0.616	07	14.56	....	..	14.74	0.476	*05*
3748.572	*15.3*	0.218	..	14.99	0.092	13	*15.3*	0.316	..	15.02	0.640	04	14.99	....	..	*15.3*	0.269	..
3775.556	15.47	0.328	*09*	15.61	0.395	*09*	15.73	0.382	21	14.94	0.242	*23*	15.21	....	..	14.94	0.138	*01*
3960.869	14.12	0.007	*13*	14.61	0.030	12	14.99	0.159	16	14.76	0.200	*37*	14.99	....	..	15.42	0.163	43
4014.745	15.16	0.134	08	14.32	0.544	*08*	....	....	..	....	....	..	....	....	..	14.89	0.310	*33*
4037.635	14.99	0.131	*07*	14.37	0.020	*07*	14.32	0.018	*08*	14.61	0.437	*17*	14.32	....	..	14.71	0.102	*18*
" .663	14.89	0.159	*33*	14.71	0.048	13	14.32	0.046	*08*	14.71	0.465	*14*	14.66	....	..	14.71	0.130	*22*
4041.675	15.42	0.189	06	15.42	0.248	*12*	15.42	0.213	30	15.22	0.265	11	14.32	....	..	14.98	0.125	05
4052.600	15.06	0.165	*20*	15.58	0.283	*02*	14.89	0.083	41	15.06	0.658	19	14.40	....	..	14.82	0.003	07
4058.548	15.06	0.141	*07*	15.37	0.241	*16*	15.26	0.263	*08*	15.06	0.287	09	14.40	....	..	15.06	0.428	09
" .662	15.47	0.255	*05*	15.58	0.355	*10*	15.78	0.377	26	14.61	0.401	*10*	14.94	....	..	14.82	0.039	04
" .780	15.47	0.373	*10*	15.78	0.473	10	14.40	0.014	03	15.11	0.519	07	14.27	....	..	15.06	0.157	07
" .854	15.26	0.447	28	14.40	0.003	*01*	14.40	0.088	*10*	15.24	0.593	15	14.27	....	..	15.06	0.231	*05*
4066.635	15.58	0.265	05	15.26	0.161	00	15.26	0.178	32	14.92	0.651	01	14.89	....	..	14.82	0.480	04
4067.636	15.73	0.271	20	14.66	0.073	*08*	15.26	0.218	13	15.26	0.248	09	14.66	....	..	14.82	0.477	03
4069.560	15.47	0.204	04	15.78	0.363	10	15.26	0.219	12	14.71	0.066	*01*	14.82	....	..	15.26	0.393	12

J. D.	No. 63. Per. $0^d.497677$			No. 64. Per. $0^d.544510$			No. 65. Per. $0^d.480665$			No. 66. Per. $0^d.702102$			No. 67. Per. not det'd.			No. 68. Per. $0^d.502136$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
4069.795	15.06	0.439	*07*	14.56	0.054	*05*	15.26	0.454	56	14.86	0.301	01	14.82	....	..	15.37	0.125	44
4070.655	15.47	0.304	*08*	15.78	0.369	09	15.58	0.353	08	14.94	0.459	11	14.27	....	..	14.82	0.483	04
4071.538	15.26	0.192	*13*	15.21	0.163	*06*	15.42	0.275	06	15.00	0.639	01	14.82	....	..	15.42	0.362	20
" .747	15.58	0.401	03	15.78	0.372	09	14.82	0.003	46	15.18	0.146	25	14.17	....	..	15.06	0.069	23
4072.538	15.58	0.196	19	14.82	0.074	05	15.73	0.313	27	15.26	0.235	08	14.66	....	..	15.47	0.358	25
" .745	15.58	0.403	04	15.58	0.281	*02*	14.04	0.040	*36*	14.82	0.442	03	14.40	....	..	14.89	0.063	06
4073.553	15.47	0.216	03	14.32	0.000	*08*	15.78	0.367	27	15.26	0.548	16	14.56	....	..	15.37	0.368	16
" .758	15.42	0.421	01	15.37	0.205	*06*	14.66	0.091	15	14.82	0.051	12	14.82	....	..	15.06	0.071	23
4074.561	15.26	0.229	*21*	15.98	0.464	29	15.78	0.414	28	15.24	0.152	27	14.27	....	..	15.42	0.372	23
4085.663	15.58	0.382	01	15.04	0.131	*05*	15.26	0.461	70	14.66	0.020	*04*	14.22	....	..	14.61	0.427	*35*
4086.608	15.26	0.331	*31*	14.40	0.531	*01*	....	....	..	15.06	0.263	*05*	14.94	....	..	15.26	0.368	06
4092.573	15.58	0.324	02	14.99	0.507	14	15.26	0.161	40	14.94	0.611	*14*	14.82	....	..	15.26	0.307	04
4093.532	15.98	0.288	44	15.98	0.377	29	15.11	0.158	28	15.21	0.166	19	14.99	....	..	15.26	0.262	11
" .762	14.04	0.020	*28*	14.71	0.062	04	....	....	..	14.61	0.396	*10*	14.27	....	..	14.40	0.492	*37*
4133.607	14.22	0.051	*28*	15.42	0.158	19	14.99	0.338	*50*	15.21	0.221	04	14.66	....	..	....	....	..
4147.519	14.17	0.028	*17*	15.47	0.457	*23*	14.99	0.311	*47*	15.00	0.091	22	14.32	....	..	14.82	0.018	06
4437.629	14.51	0.490	18	16.08	0.344	41	14.61	0.099	08	15.32	0.233	14	14.27	....	..	....	....	..
4795.632	14.66	0.166	*59*	14.66	0.059	02	14.22	0.007	*14*	14.86	0.164	*16*	14.66	....	..	14.82	0.376	*36*
4846.568	15.47	0.339	*10*	15.47	0.356	*21*	14.66	0.473	23	15.23	0.549	14	15.16	....	..	14.82	0.094	*05*
4860.582	15.47	0.418	00	15.47	0.212	00	14.22	0.067	*21*	15.05	0.521	00	14.66	....	..	14.61	0.048	*19*
4876.513	15.37	0.423	*03*	15.73	0.352	05	14.66	0.136	*07*	14.61	0.303	*22*	14.61	....	..	15.06	0.413	00
4886.535	14.27	0.491	*05*	....	....	..	14.17	0.064	*25*	15.02	0.496	05	14.66	....	..	15.06	0.392	*08*
5560.608	15.37	0.212	*06*	14.51	0.543	11	....	....	..	14.92	0.551	*18*	14.66	....	..	14.94	0.097	07
5562.605	15.16	0.218	*29*	15.78	0.362	10	15.42	0.319	*05*	15.16	0.442	36	14.66	....	..	14.82	0.085	*03*
5563.594	15.37	0.212	*06*	15.37	0.262	*21*	15.47	0.347	*03*	14.86	0.027	17	15.37	....	..	14.94	0.070	11
5579.551	15.47	0.243	*02*	15.83	0.428	13	15.78	0.442	53	14.98	0.537	*11*	14.56	....	..	15.06	0.461	23
5581.558	15.42	0.260	*11*	15.47	0.257	*10*	14.22	0.045	*18*	15.18	0.438	39	14.61	....	..	14.82	0.459	*02*
5899.564	15.57	0.250	06	15.57	0.269	*01*	15.83	0.332	35	14.99	0.392	29	14.32	....	..	14.89	0.111	*02*
5901.555	15.42	0.250	*09*	14.76	0.082	*05*	15.42	0.400	*10*	14.66	0.277	*37*	14.99	....	..	14.94	0.093	08
" .646	15.73	0.341	16	15.42	0.173	10	14.27	0.010	*10*	14.99	0.368	29	14.32	....	..	15.42	0.184	39
6633.655	15.42	0.268	*11*	15.42	0.361	*26*	....	....	..	14.71	0.084	*06*	14.27	....	..	14.61	0.079	*23*
6634.509	14.89	0.126	*14*	15.22	0.126	17	15.42	0.340	*07*	14.89	0.236	*29*	14.51	....	..	14.71	0.431	*23*
" .566	15.42	0.183	07	15.42	0.183	06	15.83	0.397	31	15.22	0.293	30	14.71	....	..	14.66	0.488	*12*
" .682	15.42	0.299	*12*	15.22	0.299	*40*	14.61	0.032	22	14.89	0.409	17	14.27	....	..	14.89	0.102	00
7021.639	14.32	0.063	*26*	14.99	0.109	03	14.32	0.054	*09*	14.71	0.508	*31*	14.37	....	..	14.71	0.414	*32*
7023.629	14.32	0.063	*26*	15.83	0.466	14	14.61	0.121	*06*	14.71	0.392	00	14.27	....	..	14.71	0.395	*42*
" .678	14.71	0.112	*25*	14.76	0.515	08	14.71	0.170	*20*	14.71	0.441	*08*	14.12	....	..	14.71	0.444	*17*
8157.558	15.57	0.284	03	15.42	0.180	07	14.99	0.162	13	14.89	0.426	14	14.27	....	..	14.71	0.501	*05*
9533.816	14.71	0.465	01	15.57	0.461	*12*	15.83	0.276	46	14.89	0.564	*22*	....	....	..	....	....	..
" .888	14.61	0.039	20	14.51	0.533	11	15.83	0.348	33	14.89	0.636	*11*	....	....	..	....	....	..
" .914	14.89	0.065	30	14.71	0.015	28	15.73	0.374	22	....	....	..	....	....	..	....	....	..
" .947	14.71	0.098	*12*	14.32	0.048	*26*	15.42	0.407	*09*	14.56	0.695	*15*	....	....	..	....	....	..
9537.761	15.42	0.428	06	14.71	0.050	11	15.83	0.375	31	14.51	0.296	*39*	....	....	..	....	....	..
" .786	14.89	0.453	00	14.79	0.075	02	15.73	0.400	21	14.56	0.321	*20*	....	....	..	....	....	..
" .812	14.51	0.479	00	14.89	0.101	*02*	14.99	0.426	*49*	14.56	0.347	*15*	....	....	..	....	....	..
" .836	14.61	0.006	36	14.99	0.125	*05*	14.32	0.450	*60*	14.66	0.371	*04*	....	....	..	....	....	..
" .874	14.71	0.044	27	15.42	0.163	16	14.66	0.008	30	14.56	0.409	*17*	....	....	..	....	....	..
" .899	14.89	0.069	27	15.42	0.188	06	14.71	0.033	32	14.56	0.434	*22*	....	....	..	....	....	..
" .924	14.99	0.094	18	15.42	0.213	*05*	14.99	0.058	57	14.76	0.459	*07*	....	....	..	....	....	..
" .950	14.99	0.120	*02*	15.42	0.239	*10*	14.89	0.084	40	14.71	0.485	*22*	....	....	..	....	....	..

J. D.	No. 69. Per. 0d.494876			No. 70. Per. 0d.558520			No. 71. Per. 0d.502468			No. 72. Per. 0d.562108			No. 73. Per. not det'd.			No. 74. Per. not det'd.		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
1145.794	*14.5*	0.458	..	*14.5*	0.211	..	*14.5*	0.303	..	*14.5*	0.074	..	*14.5*	....	..	13.83	....	..
1148.796	14.27	0.491	10	*14.9*	0.420	..	*15.3*	0.290	..	*15.3*	0.265	..	14.56	....	..	14.17	....	..
1155.796	14.66	0.068	26	*14.9*	0.160	..	*14.9*	0.256	..	14.8	0.520	..	*14.9*	....	..	13.78	....	..
1161.809	14.56	0.142	*32*	14.56	0.029	01	15.3	0.239	..	15.1	0.350	..	14.66	....	..	14.17	....	..
1174.794	*14.9*	0.260	..	*14.9*	0.168	..	*14.6*	0.160	..	*14.9*	0.406	..	14.8	....	..	13.78	....	..
1178.785	*15.1*	0.292	..	*15.1*	0.249	..	*14.9*	0.131	..	*14.9*	0.463	..	14.27	....	..	14.17	....	..
1199.701	*15.3*	0.424	..	*15.1*	0.500	..	15.3	0.446	..	14.61	0.019	00	14.94	....	..	13.83	....	..
3346.540	14.27	0.491	10	15.40	0.388	*09*	15.78	0.239	30	15.11	0.167	04	14.56	....	..	14.12	....	..
3366.544	15.42	0.205	20	15.70	0.286	24	15.21	0.144	07	15.47	0.497	04	15.32	....	..	13.83	....	..
3369.698	*15.3*	0.389	..	15.02	0.088	12	*15.3*	0.284	..	15.3	0.279	..	14.66	....	..	14.17	....	..
3370.528	15.78	0.230	45	15.77	0.360	28	14.99	0.109	03	14.89	0.547	22	14.99	....	..	13.95	....	..
3371.529	15.83	0.241	47	15.52	0.244	11	14.99	0.105	06	15.47	0.423	*02*	14.76	....	..	13.83	....	..
3374.502	15.21	0.245	*16*	15.54	0.424	05	14.61	0.063	*04*	14.61	0.024	00	14.56	....	..	13.83	....	..
" .538	*15.3*	0.281	..	*15.0*	0.460	..	14.94	0.099	04	14.66	0.060	*02*	14.56	....	..	13.88	....	..
3376.502	15.34	0.265	*06*	15.32	0.190	01	14.66	0.053	*06*	15.47	0.337	04	14.61	....	..	14.17	....	..
" .543	15.16	0.306	*27*	15.32	0.231	*08*	14.79	0.094	*08*	15.61	0.378	14	14.56	....	..	13.88	....	..
" .584	15.37	0.347	*07*	15.36	0.272	*10*	15.05	0.135	*04*	15.32	0.419	*16*	14.56	....	..	14.17	....	..
" .677	14.94	0.440	*33*	15.42	0.365	*07*	15.16	0.228	*28*	14.99	0.512	*33*	14.66	....	..	13.73	....	..
3377.578	15.37	0.351	*06*	15.04	0.149	*16*	14.89	0.124	*14*	15.27	0.289	*08*	14.51	....	..	13.40	....	..
3378.579	15.21	0.363	*22*	14.46	0.033	*11*	14.89	0.120	*12*	14.99	0.166	*08*	14.51	....	..	13.83	....	..
3380.500	15.42	0.304	*01*	15.40	0.279	*06*	14.32	0.031	*05*	15.47	0.401	*01*	14.99	....	..	13.83	....	..
" .602	15.47	0.406	05	15.40	0.381	*10*	14.66	0.133	*41*	15.37	0.503	*02*	14.32	....	..	13.99	....	..
3390.604	14.12	0.016	*05*	15.52	0.329	04	14.66	0.086	*16*	15.6	0.387	..	14.76	....	..	14.17	....	..
3408.568	15.11	0.164	09	15.24	0.421	*25*	14.94	0.464	*11*	15.78	0.363	32	14.56	....	..	14.17	....	..
3409.544	14.89	0.150	*03*	15.02	0.280	*44*	15.47	0.435	*07*	15.05	0.215	*15*	14.42	....	..	13.83	....	..
" .623	15.37	0.229	06	15.34	0.359	*14*	14.12	0.011	*15*	15.42	0.294	06	14.61	....	..	14.22	....	..
3411.603	15.37	0.230	04	14.72	0.104	*29*	14.42	0.484	02	14.27	0.026	*34*	14.32	....	..	13.45	....	..
3412.560	15.16	0.197	*01*	14.89	0.503	07	15.61	0.436	07	15.42	0.421	*06*	14.56	....	..	13.58	....	..
3413.569	15.37	0.216	10	15.36	0.395	*14*	15.47	0.440	*06*	15.47	0.305	10	14.66	....	..	13.95	....	..
3414.620	15.47	0.278	06	15.26	0.329	*22*	14.66	0.486	30	15.08	0.232	*15*	14.66	....	..	14.17	....	..
3415.489	15.05	0.157	08	14.92	0.081	05	15.83	0.350	23	14.66	0.539	*11*	14.99	....	..	14.12	....	..
" .531	15.37	0.199	18	15.11	0.123	00	15.21	0.392	*39*	14.42	0.019	*19*	15.21	....	..	14.12	....	..
" .572	15.42	0.240	07	15.11	0.164	*14*	15.57	0.433	02	14.66	0.060	*02*	14.99	....	..	14.17	....	..
" .614	15.16	0.282	*25*	15.24	0.206	*10*	14.94	0.475	29	14.76	0.102	*10*	14.66	....	..	14.17	....	..
3419.548	*16.4*	0.257	..	15.34	0.230	*05*	15.37	0.389	*23*	14.99	0.101	14	15.05	....	..	13.99	....	..
3422.494	*16.0*	0.234	..	*15.2*	0.384	..	*16.0*	0.320	..	15.32	0.237	08	14.66	....	..	13.45	....	..
" .591	*16.4*	0.331	..	*15.2*	0.481	..	*15.4*	0.417	..	*15.4*	0.334	..	15.16	....	..	13.88	....	..
3423.506	15.73	0.256	34	15.76	0.279	30	15.61	0.328	02	14.99	0.124	05	14.56	....	..	13.83	....	..
3666.649	16.0	0.415	..	15.78	0.465	36	15.42	0.276	*12*	16.0	0.437	..	14.76	....	..	14.12	....	..
3673.681	13.83	0.024	*36*	15.22	0.237	*19*	15.78	0.273	24	15.11	0.161	05	15.16	....	..	13.95	....	..
3693.638	*15.3*	0.186	..	14.80	0.087	*10*	15.26	0.132	18	*15.3*	0.445	..	15.16	....	..	13.83	....	..
3694.577	14.66	0.135	*17*	*16.0*	0.467	..	14.56	0.066	*12*	16.0	0.259	..	14.99	....	..	14.02	....	..
" .615	14.89	0.173	*18*	14.89	0.505	09	14.89	0.104	*04*	15.42	0.297	05	14.94	....	..	14.12	....	..
3695.519	14.89	0.087	36	15.93	0.292	46	14.27	0.003	02	14.66	0.077	*07*	14.89	....	..	14.17	....	..
" .561	14.94	0.129	14	15.32	0.334	*16*	14.71	0.045	21	14.94	0.119	01	14.66	....	..	14.12	....	..
" .602	14.99	0.170	*05*	15.57	0.375	08	14.89	0.086	07	14.99	0.160	*06*	14.66	....	..	14.12	....	..
" .644	*16.4*	0.212	..	15.78	0.417	28	15.16	0.128	12	15.16	0.202	00	14.71	....	..	14.12	....	..
3698.504	14.66	0.103	02	14.99	0.485	*16*	14.66	0.476	03	15.05	0.252	*22*	14.89	....	..	13.88	....	..
3699.499	14.56	0.108	*13*	15.32	0.363	*17*	15.16	0.466	14	14.99	0.122	05	14.99	....	..	13.83	....	..
" .542	14.76	0.151	*16*	15.37	0.406	*13*	14.32	0.006	07	14.89	0.165	*17*	14.71	....	..	13.83	....	..

J. D.	No. 69.	Per. $0^d.494876$		No. 70.	Per. $0^d.558520$		No. 71.	Per. $0^d.502468$		No. 72.	Per. $0^d.562108$		No. 73.	Per. not det'd.		No. 74.	Per. not det'd.	
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
3699.584	14.99	0.193	*18*	15.47	0.448	00	14.56	0.048	03	15.16	0.207	*02*	14.66	....	..	14.02	....	..
3713.513	15.47	0.266	07	15.57	0.414	08	15.37	0.410	*22*	14.99	0.084	21	14.89	....	..	13.73	....	..
" .680	15.57	0.433	24	14.79	0.022	27	14.89	0.075	15	15.27	0.251	*02*	14.89	....	..	14.02	....	..
3717.517	15.37	0.311	*05*	14.89	0.508	16	15.37	0.395	*23*	15.21	0.153	18	15.16	....	..	14.12	....	..
" .692	14.27	0.486	06	15.16	0.124	05	14.94	0.067	26	15.78	0.328	37	14.66	....	..	13.83	....	..
" .817	14.66	0.116	*07*	15.46	0.249	03	15.3	0.192	..	15.46	0.453	*03*	14.94	....	..	14.17	....	..
3724.535	15.47	0.400	04	15.47	0.265	03	15.47	0.378	*13*	15.61	0.426	11	14.89	....	..	14.17	....	..
" .676	14.27	0.046	01	15.70	0.406	20	14.27	0.017	*01*	14.76	0.004	16	15.16	....	..	13.83	....	..
3748.572	16.0	0.188	..	15.26	0.286	*20*	*16.0*	0.297	..	*16.0*	0.292	..	14.66	....	..	13.83	....	..
3775.556	15.42	0.449	32	15.34	0.461	*09*	15.21	0.147	06	15.47	0.295	11	14.66	....	..	14.12	....	..
3960.869	14.99	0.184	*13*	15.40	0.345	*08*	14.32	0.050	*22*	14.66	0.112	*25*	14.56	....	..	14.07	....	..
4014.745	14.61	0.118	*12*	14.56	0.045	*07*	14.89	0.162	*34*	14.56	0.026	*05*	14.89	....	..	14.08	....	..
4037.635	*15.6*	0.244	..	14.56	0.036	*02*	*16.0*	0.441	..	15.37	0.431	*12*	14.56	....	..	13.98	....	..
" .663	15.6	0.272	..	14.74	0.064	*01*	14.66	0.469	*24*	15.42	0.459	*07*	14.51	....	..	13.45	....	..
4041.675	....	....	..	15.29	0.166	04	15.22	0.461	05	14.89	0.537	12	14.89	....	..	14.12	....	..
4052.600	15.47	0.363	04	15.34	0.479	04	15.98	0.332	39	15.26	0.220	05	14.99	....	..	14.04	....	..
4058.548	15.37	0.372	*06*	15.36	0.283	*10*	15.58	0.250	07	15.06	0.546	38	14.82	....	..	13.52	....	..
" .662	14.22	0.486	01	15.34	0.397	*16*	15.47	0.364	*13*	14.82	0.098	*01*	15.06	....	..	13.83	....	..
" .780	14.66	0.109	*02*	14.42	0.515	*21*	14.56	0.482	11	15.06	0.216	*14*	14.40	....	..	14.04	....	..
" .854	15.06	0.183	*06*	14.82	0.031	25	14.56	0.054	*01*	15.26	0.290	*09*	14.40	....	..	14.04	....	..
4066.635	14.27	0.046	00	14.48	0.551	08	15.58	0.297	01	15.11	0.202	*06*	14.40	....	..	14.22	....	..
4067.636	14.40	0.057	*06*	15.88	0.435	39	15.98	0.294	41	14.94	0.079	20	14.56	....	..	13.52	....	..
4069.560	14.17	0.002	00	15.24	0.125	12	15.58	0.208	18	15.37	0.316	*01*	15.21	....	..	14.04	....	..
" .795	15.58	0.237	24	15.58	0.360	09	15.58	0.443	07	14.89	0.551	26	14.82	....	..	14.17	....	..
4070.655	14.82	0.107	14	15.06	0.103	06	15.78	0.298	21	15.21	0.287	*13*	14.84	....	..	14.04	....	..
4071.538	14.17	0.000	00	15.73	0.427	24	15.26	0.176	*01*	14.82	0.046	18	15.16	....	..	14.04	....	..
" .747	15.26	0.209	03	15.06	0.078	23	15.78	0.385	18	15.26	0.255	*03*	14.61	....	..	13.52	....	..
4072.538	14.12	0.011	*04*	15.58	0.310	10	15.47	0.171	21	15.37	0.484	*10*	15.06	....	..	14.04	....	..
" .745	15.42	0.218	15	14.82	0.517	20	15.78	0.378	18	14.89	0.129	*07*	14.61	....	..	13.83	....	..
4073.553	14.22	0.036	*01*	15.58	0.208	24	15.58	0.181	27	15.37	0.375	*10*	14.99	....	..	13.52	....	..
" .758	15.47	0.241	12	15.58	0.413	08	15.78	0.386	18	14.99	0.017	39	14.66	....	..	14.04	....	..
4074.561	14.82	0.054	50	15.06	0.099	09	15.26	0.184	*06*	15.37	0.258	08	15.06	....	..	14.04	....	..
4085.663	15.37	0.269	*04*	14.82	0.031	25	15.26	0.232	*20*	14.89	0.118	*02*	14.61	....	..	14.17	....	..
4086.608	15.26	0.224	*04*	15.26	0.417	*24*	15.06	0.172	*20*	15.26	0.501	*15*	15.06	....	..	14.17	....	..
4092.573	15.37	0.251	*02*	15.26	0.239	*15*	15.06	0.107	12	15.26	0.283	*08*	14.82	....	..	14.04	....	..
4093.532	15.47	0.220	19	15.06	0.081	20	14.71	0.061	07	15.06	0.118	15	14.61	....	..	13.83	....	..
" .762	15.58	0.450	50	15.26	0.311	*22*	15.26	0.291	*30*	15.06	0.348	*37*	14.82	....	..	14.04	....	..
4133.607	15.16	0.210	*08*	14.71	0.501	*13*	15.78	0.441	25	15.42	0.283	09	14.66	....	..	13.88	....	..
4147.519	15.27	0.265	*13*	14.99	0.450	*48*	15.37	0.284	*18*	14.99	0.142	*01*	14.61	....	..	13.83	....	..
4437.629	16.15	0.378	72	15.16	0.129	02	14.99	0.470	14	14.94	0.205	*23*	14.89	....	..	13.73	....	..
4795.632	14.22	0.091	*33*	14.56	0.121	*54*	15.47	0.213	05	14.66	0.145	*35*	14.61	....	..	14.17	....	..
4846.568	14.56	0.055	24	15.01	0.232	*39*	*16.4*	0.400	..	15.42	0.491	*02*	14.56	....	..	14.12	....	..
4860.582	15.37	0.212	12	15.42	0.283	*04*	15.47	0.345	*12*	15.47	0.452	*02*	14.61	....	..	14.17	....	..
4876.513	15.37	0.307	*05*	14.56	0.016	09	15.73	0.197	37	15.37	0.082	60	14.66	....	..	14.17	....	..
4886.535	14.94	0.431	*40*	14.61	0.544	20	14.89	0.170	*36*	14.89	0.548	23	14.89	....	..	14.17	....	..
5560.608	14.17	0.483	*05*	15.16	0.483	00	15.47	0.433	*08*	14.99	0.092	18	15.16	....	..	14.17	....	..
5562.605	13.83	0.006	*34*	15.37	0.246	*04*	15.78	0.420	20	15.78	0.402	30	14.66	....	..	14.17	....	..
5563.594	14.17	0.005	00	14.99	0.118	*09*	15.47	0.404	*13*	15.47	0.267	16	14.89	....	..	13.73	....	..
5579.551	14.89	0.126	11	15.61	0.436	12	15.47	0.282	*09*	14.71	0.485	*75*	14.71	....	..	14.12	....	..
5581.558	14.99	0.154	03	15.16	0.209	*18*	15.73	0.279	19	15.37	0.244	10	14.61	....	..	14.17	....	..

J. D.	No. 69. Per. 0d.494876			No. 70. Per. 0d.558520			No. 71. Per. 0d.502468			No. 72. Per. 0d.562108			No. 73. Per. not det'd.			No. 74. Per. not det'd.		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
5899.564	15.04	0.449	*04*	15.73	0.417	23	15.42	0.223	*02*	14.56	0.097	*26*	14.51	....	..	13.68	....	..
5901.555	14.89	0.461	17	15.27	0.174	00	15.27	0.204	*12*	15.37	0.401	*11*	14.56	....	..	14.17	....	..
" .646	14.32	0.057	00	15.42	0.265	*02*	15.73	0.295	16	15.54	0.492	10	14.71	....	..	14.14	....	..
6633.655	14.71	0.144	*19*	14.42	0.055	*29*	14.71	0.208	R	14.71	0.075	*02*	14.51	....	..	13.63	....	..
6634.509	14.17	0.009	00	15.42	0.350	*07*	14.66	0.058	05	15.54	0.366	08	14.32	....	..	13.88	....	..
" .566	14.66	0.066	27	15.42	0.407	*08*	14.99	0.115	00	15.22	0.423	*27*	14.46	....	..	13.68	....	..
" .682	14.71	0.182	*40*	14.32	0.523	*21*	14.99	0.231	*47*	14.66	0.539	*10*	14.71	....	..	14.17	....	..
7021.639	15.12	0.146	22	15.73	0.426	24	15.57	0.287	01	14.99	0.204	*18*	14.66	....	..	14.07	....	..
7023.629	15.04	0.156	08	15.42	0.182	13	15.42	0.267	*11*	15.37	0.508	01	14.51	....	..	13.58	....	..
" .678	15.42	0.205	20	15.73	0.231	33	15.73	0.316	15	15.47	0.557	87	14.56	....	..	13.78	....	..
8157.558	15.32	0.324	*11*	15.27	0.315	*21*	14.99	0.126	*04*	14.89	0.103	03	14.51	....	..	14.07	....	..
9533.816	....	....	..	....	....	..	....	....	..	....	....	..	14.66	....	..	13.93	....	..
" .888	....	....	..	....	....	..	....	....	..	....	....	..	14.22	....	..	14.12	....	..
" .914	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	14.07	....	..
" .947	....	....	..	....	....	..	....	....	..	....	....	..	14.17	....	..	13.93	....	..
9537.761	....	....	..	....	....	..	....	....	..	....	....	..	14.17	....	..	14.17	....	..
" .786	....	....	..	....	....	..	....	....	..	....	....	..	14.27	....	..	14.17	....	..
" .812	....	....	..	....	....	..	....	....	..	....	....	..	14.56	....	..	14.17	....	..
" .836	....	....	..	....	....	..	....	....	..	....	....	..	14.56	....	..	13.93	....	..
" .874	....	....	..	....	....	..	....	....	..	....	....	..	14.89	....	..	13.83	....	..
" .899	....	....	..	....	....	..	....	....	..	....	....	..	14.89	....	..	13.93	....	..
" .924	....	....	..	....	....	..	....	....	..	....	....	..	14.99	....	..	14.07	....	..
" .950	....	....	..	....	....	..	....	....	..	....	....	..	14.71	....	..	14.07	....	..

J. D.	No. 75. Per. 0d.686880			No. 76. Per. not det'd.			No. 77. Per. 0d.847070			No. 78. Per. not det'd.			No. 79. Per. 0d.4997856			No. 80. Per. 0d.503260		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
1145.794	*14.5*	0.357	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
1148.796	*14.9*	0.612	..	14.8	....	..	14.64	0.833	09	14.66	....	..	14.66	0.046	02	....	....	..
1155.796	14.66	0.056	*11*	14.8	....	..	14.74	0.209	*08*	14.8	....	..	....	....	..	14.8	....	..
1161.809	*15.1*	0.574	..	15.16	....	..	14.72	0.293	*22*	14.79	....	..	14.66	0.065	*10*	*15.1*	....	..
1174.794	*14.6*	0.508	..	*14.9*	....	..	....	....	..	14.61	....	..	14.66	0.055	*05*	....	....	..
1178.785	*14.9*	0.378	..	*14.9*	....	..	14.74	0.328	*25*	14.92	....	..	14.66	0.048	00	14.66	0.116	*48*
1199.701	14.66	0.001	*04*	14.66	....	..	14.48	0.067	*13*	14.66	....	..	14.99	0.473	30	14.89	0.398	*30*
3346.540	15.16	0.340	*09*	14.56	....	..	14.88	0.430	*23*	14.66	....	..	14.66	0.233	*02*	14.71	0.330	*11*
3366.544	15.47	0.424	13	14.56	....	..	14.66	0.105	00	15.27	....	..	14.56	0.245	*11*	15.11	0.204	07
3369.698	14.94	0.144	02	14.94	....	..	14.94	0.718	00	14.94	....	..	14.94	0.401	*19*	14.66	0.338	*17*
3370.528	15.21	0.287	02	14.99	....	..	14.89	0.700	*14*	15.11	....	..	14.71	0.231	02	15.37	0.162	16
3371.529	15.42	0.601	11	15.21	....	..	14.51	0.007	*05*	15.11	....	..	14.61	0.232	*08*	15.11	0.156	*11*
3374.502	14.89	0.140	*03*	14.99	....	..	14.99	0.439	*12*	15.16	....	..	14.71	0.207	*09*	15.08	0.109	*05*
" .538	14.66	0.176	*32*	15.36	....	..	15.16	0.475	02	14.89	....	..	14.66	0.243	00	15.11	0.145	*10*
3376.502	14.66	0.079	*15*	14.61	....	..	14.61	0.745	*19*	14.99	....	..	14.89	0.208	08	15.16	0.096	08
" .543	14.89	0.120	02	14.66	....	..	14.50	0.786	*14*	15.16	....	..	14.89	0.249	23	15.32	0.137	12
" .584	14.89	0.161	*07*	14.89	....	..	14.48	0.827	*08*	15.37	....	..	14.94	0.290	21	15.47	0.178	29
" .677	14.66	0.254	*48*	14.66	....	..	14.64	0.073	02	14.66	....	..	....	....	..	....	....	..
3377.578	14.99	0.468	*38*	14.99	....	..	14.74	0.127	06	14.99	....	..	14.89	0.284	17	15.11	0.166	*10*
3378.579	14.71	0.095	*12*	14.66	....	..	15.00	0.281	07	14.89	....	..	14.84	0.285	12	15.37	0.160	15
3380.500	15.37	0.643	36	14.89	....	..	15.22	0.508	07	15.37	....	..	14.66	0.207	*16*	14.79	0.068	*18*
" .602	14.66	0.058	*12*	15.37	....	..	15.36	0.610	18	14.89	....	..	14.94	0.309	11	15.47	0.170	28
3390.604	16.0	0.443	..	14.99	....	..	15.21	0.447	09	15.16	....	..	14.89	0.316	00	14.89	0.107	*23*

J. D.	No. 75. Per. $0^d.686880$			No. 76. Per. not det'd.			No. 77. Per. $0^d.847070$			No. 78. Per. not det'd.			No. 79. Per. $0^d.4997856$			No. 80. Per. $0^d.503260$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
3408.568	15.27	0.548	*13*	14.66	....	..	14.66	0.622	*52*	14.94	....	..	14.66	0.287	*06*	15.42	0.457	20
3409.544	14.89	0.151	*04*	14.89	....	..	14.44	0.751	*33*	14.66	....	..	14.56	0.264	*11*	15.37	0.426	12
" .623	14.99	0.230	*10*	14.89	....	..	14.61	0.830	05	14.99	....	..	14.99	0.343	*03*	15.47	0.002	62
3411.603	14.66	0.149	*27*	14.66	....	..	15.11	0.269	21	14.94	....	..	15.05	0.324	11	15.37	0.472	30
3412.560	15.37	0.419	04	14.99	....	..	15.00	0.379	*04*	15.16	....	..	14.89	0.281	18	15.32	0.423	08
3413.569	14.66	0.054	*11*	14.66	....	..	15.21	0.541	05	14.89	....	..	14.94	0.290	21	15.47	0.425	23
3414.620	14.99	0.419	*34*	14.76	....	..	14.61	0.745	*19*	14.94	....	..	15.01	0.342	*01*	15.47	0.470	37
3415.489	14.99	0.601	*32*	14.94	....	..	14.58	0.767	*14*	15.16	....	..	14.71	0.211	*08*	14.76	0.332	*06*
" .531	14.94	0.643	*07*	14.94	....	..	14.61	0.809	04	15.16	....	..	14.61	0.253	*05*	15.04	0.374	*04*
" .572	14.66	0.684	*06*	15.11	....	..	14.66	0.003	10	15.05	....	..	14.76	0.294	01	15.11	0.415	*13*
" .614	14.56	0.039	*18*	14.99	....	..	14.61	0.045	02	14.94	....	..	14.94	0.336	*05*	15.21	0.457	*01*
3419.548	15.42	0.538	02	14.99	....	..	14.94	0.590	*24*	15.11	....	..	14.66	0.272	*02*	14.66	0.365	*36*
3422.494	14.89	0.050	13	14.99	....	..	14.89	0.148	17	14.89	....	..	14.71	0.219	*02*	14.66	0.292	*07*
" .591	15.16	0.147	23	15.21	....	..	15.14	0.245	27	15.16	....	..	14.66	0.316	*21*	14.79	0.389	*35*
3423.506	15.57	0.375	28	14.66	....	..	15.08	0.313	11	15.11	....	..	14.66	0.232	*03*	14.66	0.297	*07*
3666.649	14.99	0.363	*29*	14.66	....	..	14.66	0.347	*35*	14.89	....	..	14.66	0.479	00	....	....	..
3673.681	15.37	0.526	*03*	14.66	....	..	15.02	0.602	*16*	15.16	....	..	14.61	0.014	01	15.16	0.352	24
3693.638	*15.3*	0.563	..	15.16	....	..	14.66	0.230	*18*	15.16	....	..	14.56	0.480	*09*	....	....	..
3694.577	14.99	0.129	10	15.16	....	..	14.94	0.322	*05*	15.21	....	..	15.16	0.419	07	....	....	..
" .615	14.99	0.167	02	14.94	....	..	14.99	0.360	*04*	15.16	....	..	14.99	0.457	16	14.99	0.149	*23*
3695.519	15.16	0.384	*14*	14.89	....	..	14.99	0.417	*10*	14.99	....	..	15.11	0.361	03	14.89	0.047	*02*
" .561	15.32	0.426	*02*	14.89	....	..	14.99	0.459	*14*	14.89	....	..	15.21	0.403	08	15.05	0.089	*01*
" .602	15.57	0.467	20	14.71	....	..	14.99	0.500	*15*	14.99	....	..	14.94	0.444	00	15.05	0.130	*13*
" .644	15.78	0.509	39	14.66	....	..	15.27	0.542	10	15.16	....	..	14.66	0.486	02	15.11	0.172	*08*
3698.504	14.99	0.621	*21*	14.94	....	..	14.66	0.013	09	14.89	....	..	....	....	..	14.66	0.012	*20*
3699.499	14.89	0.242	*23*	14.66	....	..	14.66	0.161	*07*	14.66	....	..	15.16	0.343	13	14.99	0.000	14
" .542	14.94	0.285	*25*	14.56	....	..	14.61	0.204	*20*	14.89	....	..	15.16	0.386	03	14.94	0.043	03
" .584	15.11	0.327	*13*	14.71	....	..	14.66	0.246	*21*	15.11	....	..	15.21	0.428	15	15.11	0.085	07
3713.513	15.42	0.519	03	14.99	....	..	15.16	0.622	*02*	14.89	....	..	15.16	0.363	07	15.16	0.426	*09*
" .680	15.11	0.686	39	14.99	....	..	14.89	0.789	26	15.11	....	..	14.76	0.030	15	14.89	0.090	*18*
3717.517	15.42	0.401	10	14.99	....	..	15.05	0.391	*02*	14.66	....	..	14.99	0.369	*11*	15.37	0.404	15
" .692	15.61	0.576	24	14.61	....	..	15.16	0.566	*01*	15.11	....	..	14.66	0.044	02	14.89	0.076	*11*
" .817	14.94	0.015	21	14.94	....	..	14.94	0.691	*13*	14.76	....	..	....	....	..	....	....	..
3724.535	15.47	0.551	08	14.71	....	..	15.34	0.632	16	15.37	....	..	15.16	0.390	03	15.05	0.377	*03*
" .676	14.79	0.005	08	14.94	....	..	14.74	0.773	05	14.66	....	..	14.56	0.031	*06*	14.89	0.014	03
3748.572	15.3	0.547	..	15.16	....	..	14.88	0.104	24	14.94	....	..	14.99	0.437	*02*	14.89	0.257	12
3775.556	15.05	0.056	28	14.66	....	..	14.64	0.829	08	14.79	....	..	14.99	0.433	*03*	14.89	0.065	*08*
3960.869	15.42	0.598	09	15.42	....	..	15.05	0.634	*13*	14.71	....	..	14.71	0.325	*22*	14.99	0.179	*19*
4014.745	14.85	0.210	*20*	14.66	....	..	14.81	0.297	*14*	15.08	....	..	15.19	0.224	48	14.82	0.206	*21*
4037.635	15.42	0.433	08	14.56	....	..	14.79	0.316	*18*	14.76	....	..	14.89	0.124	*22*	14.89	0.449	*35*
" .663	15.42	0.461	06	14.66	....	..	14.76	0.344	*25*	14.56	....	..	15.22	0.152	07	14.71	0.477	*27*
4041.675	15.42	0.352	15	14.99	....	..	14.51	0.121	*17*	14.76	....	..	15.22	0.166	08	14.89	0.463	*29*
4052.600	15.26	0.287	08	14.99	....	..	14.72	0.034	14	15.21	....	..	15.06	0.096	09	14.94	0.316	18
4058.548	14.89	0.053	12	14.82	....	..	14.44	0.053	*16*	15.06	....	..	14.82	0.046	18	14.66	0.225	*22*
" .662	15.06	0.167	09	14.89	....	..	14.58	0.167	*16*	14.89	....	..	15.06	0.160	*08*	15.06	0.339	23
" .780	15.11	0.285	*07*	14.40	....	..	14.86	0.285	*07*	15.21	....	..	14.66	0.278	*03*	15.26	0.457	04
" .854	15.21	0.359	*06*	14.51	....	..	15.06	0.359	03	14.82	....	..	14.82	0.352	*24*	14.89	0.028	02
4066.635	14.99	0.584	*36*	14.40	....	..	15.16	0.516	00	15.06	....	..	15.06	0.137	*07*	14.66	0.260	*09*
4067.636	15.11	0.212	05	14.94	....	..	15.34	0.670	21	14.82	....	..	15.06	0.138	*08*	14.82	0.254	06
4069.560	14.89	0.075	09	14.61	....	..	14.56	0.053	*04*	15.16	....	..	14.66	0.063	*08*	15.16	0.165	*05*

J. D.	No. 75. Per. $0^d.686880$			No. 76. Per. not det'd.			No. 77. Per. $0^d.847070$			No. 78. Per. not det'd.			No. 79. Per. $0^d.4997856$			No. 80. Per. $0^d.503260$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
4069.795	15.11	0.310	*12*	14.82	....	..	14.82	0.288	*11*	14.99	....	..	14.61	0.298	*16*	15.06	0.400	*15*
4070.655	15.26	0.483	*11*	14.89	....	..	14.94	0.301	*01*	15.21	....	..	15.11	0.158	*03*	14.82	0.254	06
4071.538	14.82	0.679	09	14.82	....	..	14.82	0.336	*18*	14.82	....	..	14.61	0.042	*03*	15.06	0.130	*12*
" .747	15.26	0.201	22	14.61	....	..	15.06	0.546	*11*	15.21	....	..	14.71	0.251	05	14.82	0.339	*01*
4072.538	15.26	0.306	04	14.82	....	..	15.11	0.489	*03*	15.21	....	..	14.66	0.042	02	15.06	0.124	*11*
" .745	15.26	0.513	*13*	14.66	....	..	15.26	0.696	22	15.16	....	..	14.82	0.249	15	14.66	0.331	*16*
4073.553	14.82	0.634	*28*	14.82	....	..	15.26	0.657	09	15.16	....	..	14.82	0.058	12	15.11	0.132	*08*
" .758	15.06	0.152	13	14.94	....	..	14.40	0.015	*16*	14.99	....	..	14.66	0.263	*01*	14.71	0.337	*12*
4074.561	15.26	0.268	10	14.84	....	..	14.66	0.818	09	15.06	....	..	14.66	0.066	*09*	15.16	0.134	*03*
4085.663	15.21	0.380	*09*	14.40	....	..	14.40	0.061	*21*	14.82	....	..	15.06	0.173	*06*	15.21	0.164	00
4086.608	14.82	0.638	*27*	14.66	....	..	14.82	0.159	09	15.16	....	..	14.99	0.118	*09*	15.11	0.103	00
4092.573	15.26	0.421	*08*	14.40	....	..	14.82	0.195	03	15.06	....	..	15.11	0.086	21	14.56	0.028	*31*
4093.532	14.82	0.006	11	14.71	....	..	15.06	0.307	10	14.82	....	..	14.66	0.045	02	14.61	0.484	*26*
" .762	15.26	0.236	15	14.61	....	..	15.11	0.537	*04*	15.06	....	..	....	....	..	....	....	..
4133.607	15.58	0.242	46	14.66	....	..	15.21	0.569	04	14.89	....	..	15.11	0.137	*02*	14.71	0.298	*03*
4147.519	14.92	0.417	*41*	14.66	....	..	14.66	0.081	03	14.99	....	..	14.99	0.055	29	15.37	0.119	21
4437.629	14.96	0.663	15	14.61	....	..	15.11	0.493	*03*	14.99	....	..	14.89	0.290	16	14.99	0.351	08
4795.632	15.02	0.115	16	14.61	....	..	14.61	0.186	*17*	14.66	....	..	15.16	0.446	22	15.37	0.033	49
4846.568	15.68	0.222	60	14.66	....	..	14.99	0.297	05	15.37	....	..	15.21	0.404	08	15.37	0.140	17
4860.582	15.02	0.498	*36*	14.66	....	..	14.56	0.758	*18*	15.37	....	..	15.05	0.424	*02*	14.76	0.063	*20*
4876.513	15.42	0.631	28	14.61	....	..	14.89	0.595	*29*	15.37	....	..	14.99	0.362	*10*	15.37	0.393	20
4886.535	14.89	0.350	*37*	14.89	....	..	14.99	0.452	*13*	14.99	....	..	15.47	0.388	34	14.99	0.349	10
5560.608	15.37	0.593	02	14.89	....	..	14.99	0.257	11	14.89	....	..	14.71	0.251	04	14.89	0.054	*04*
5562.605	14.99	0.530	*40*	15.11	....	..	15.42	0.560	25	15.37	....	..	14.89	0.248	22	14.89	0.038	00
5563.594	14.99	0.145	06	14.89	....	..	14.66	0.702	*35*	14.73	....	..	14.94	0.238	26	14.99	0.020	12
5579.551	14.89	0.304	*33*	14.89	....	..	15.21	0.565	04	15.05	....	..	14.71	0.202	*14*	15.16	0.376	08
5581.558	14.99	0.250	*14*	15.11	....	..	14.71	0.031	13	14.66	....	..	14.61	0.210	*18*	15.21	0.370	15
5899.564	14.99	0.231	*11*	15.22	....	..	14.99	0.385	*07*	14.99	....	..	15.17	0.352	12	15.04	0.316	27
5901.555	14.76	0.161	*20*	14.71	....	..	15.37	0.682	26	14.99	....	..	15.04	0.344	01	15.04	0.294	30
" .646	14.79	0.252	*35*	14.99	....	..	14.71	0.773	03	15.17	....	..	14.99	0.435	*02*	15.22	0.385	09
6633.655	14.71	0.047	*05*	14.71	....	..	14.51	0.067	*11*	14.71	....	..	14.71	0.258	05	14.99	0.151	*23*
6634.509	15.32	0.214	26	14.71	....	..	14.89	0.074	27	14.89	....	..	15.22	0.112	15	14.89	0.501	05
" .566	15.42	0.271	25	14.66	....	..	14.71	0.131	03	14.99	....	..	14.76	0.169	*37*	14.99	0.055	05
" .682	15.22	0.387	*09*	14.99	....	..	14.79	0.247	*08*	14.99	....	..	14.89	0.285	18	14.99	0.171	*20*
7021.639	14.99	0.631	*14*	14.66	....	..	14.71	0.093	07	14.71	....	..	14.99	0.408	*14*	15.17	0.121	01
7023.629	14.71	0.560	*68*	14.71	....	..	15.12	0.389	06	15.17	....	..	14.99	0.399	*14*	14.99	0.098	*11*
" .678	14.89	0.609	*39*	14.66	....	..	15.22	0.438	11	15.27	....	..	14.79	0.448	*12*	15.17	0.147	*03*
8157.558	15.42	0.450	06	14.71	....	..	14.89	0.091	25	14.99	....	..	14.99	0.315	11	14.99	0.182	*18*
9533.816	14.99	0.201	*05*	14.71	....	..	15.32	0.707	33	14.99	....	..	15.32	0.163	19	14.89	0.024	02
" .888	15.42	0.273	24	14.99	....	..	14.99	0.779	33	14.99	....	..	14.89	0.235	21	14.99	0.096	*11*
" .914	15.73	0.299	52	15.42	....	..	14.89	0.805	30	14.99	....	..	14.71	0.261	04	15.04	0.122	*12*
" .947	15.32	0.332	07	15.22	....	..	14.51	0.838	*04*	14.71	....	..	14.71	0.294	*05*	15.22	0.155	00
9537.761	14.56	0.024	*18*	14.99	....	..	15.04	0.417	*05*	14.99	....	..	15.22	0.110	17	14.89	0.446	*35*
" .786	14.89	0.049	13	14.99	....	..	14.99	0.442	*12*	14.99	....	..	15.32	0.135	19	14.79	0.471	*29*
" .812	14.89	0.075	08	14.99	....	..	14.99	0.468	*14*	14.99	....	..	15.22	0.161	08	14.71	0.497	*13*
" .836	14.99	0.099	16	14.79	....	..	14.89	0.492	*24*	15.32	....	..	15.22	0.185	18	14.76	0.018	*10*
" .874	14.99	0.137	08	15.12	....	..	15.12	0.530	*03*	14.99	....	..	14.99	0.223	28	14.99	0.056	05
" .899	14.99	0.162	02	14.99	....	..	14.99	0.555	*18*	14.89	....	..	14.99	0.248	33	14.99	0.081	*04*
" .924	15.27	0.187	26	14.99	....	..	15.22	0.580	04	14.89	....	..	14.99	0.273	30	15.12	0.106	00
" .950	15.32	0.213	25	14.71	....	..	15.22	0.606	04	14.71	....	..	14.71	0.299	*06*	14.99	0.132	*20*

J. D.	No. 81. Per. 0d.557332			No. 82. Per. 0d.556012			No. 83. Per. 0d.553310			No. 84. Per. 26d.5			No. 85. Per. 0d.527046.			No. 86. Per. 0d.567901		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
1145.794	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
1148.796	*14.9*	0.186	..	14.8	....	..	....	....	..	....	....	..	....	....	..	....	....	..
1155.796	*14.9*	0.498	..	14.66	....	..	....	....	..	....	....	..	....	....	..	....	....	..
1161.809	15.3	0.380	..	14.66	....	..	....	....	..	....	....	..	....	....	..	....	....	..
1174.794	....	....	..	....	....	..	*14.9*	0.420	..	....	....	..	....	....	..	....	....	..
1178.785	14.8	0.079	..	....	....	..	14.27	0.538	*22*	....	....	..	....	....	..	....	....	..
1199.701	15.3	0.374	..	14.99	....	..	15.1	0.429	..	....	....	..	....	....	..	....	....	..
3346.540	15.47	0.370	*13*	14.66	....	..	....	....	..	....	....	..	....	....	..	....	....	..
3366.544	15.61	0.310	08	14.66	....	..	14.66	0.510	*04*	....	....	..	....	....	..	....	....	..
3369.698	14.89	0.120	*11*	14.71	....	..	15.3	0.344	..	....	....	..	....	....	..	....	....	..
3370.528	15.30	0.393	*32*	14.84	....	..	14.71	0.067	*25*	....	....	..	....	....	..	....	....	..
3371.529	15.37	0.279	*11*	14.66	....	..	14.51	0.515	*12*	....	....	..	....	....	..	....	....	..
3374.502	15.47	0.465	*19*	14.84	....	..	15.37	0.168	*04*	....	....	..	....	....	..	....	....	..
" .538	*15.3*	0.501	..	14.94	....	..	....	....	..	....	....	..	....	....	..	....	....	..
3376.502	15.21	0.236	*18*	14.94	....	..	14.84	0.508	11	....	....	..	....	....	..	....	....	..
" .543	15.42	0.277	*06*	14.99	....	..	14.66	0.549	17	....	....	..	....	....	..	....	....	..
" .584	15.61	0.318	08	14.94	....	..	14.71	0.037	*02*	....	....	..	....	....	..	....	....	..
" .677	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
3377.578	15.11	0.197	*20*	14.89	....	..	15.42	0.477	*21*	....	....	..	....	....	..	....	....	..
3378.579	14.79	0.084	00	14.99	....	..	15.73	0.372	04	....	....	..	....	....	..	....	....	..
3380.500	15.78	0.333	22	14.99	....	..	15.42	0.080	38	....	....	..	....	....	..	....	....	..
" .602	16.0	0.435	..	14.99	....	..	15.47	0.182	03	....	....	..	....	....	..	....	....	..
3390.604	15.33	0.405	*30*	14.66	....	..	16.0	0.224	..	....	....	..	....	....	..	....	....	..
3408.568	14.71	0.534	*04*	14.99	....	..	15.78	0.482	21	....	....	..	....	....	..	....	....	..
3409.544	15.42	0.395	*20*	14.99	....	..	15.47	0.351	*20*	....	....	..	....	....	..	....	....	..
" .623	15.47	0.474	*17*	14.99	....	..	15.83	0.430	11	....	....	..	....	....	..	....	....	..
3411.603	15.30	0.225	*08*	14.94	....	..	15.21	0.197	*25*	....	....	..	....	....	..	....	....	..
3412.560	14.66	0.067	*02*	15.05	....	..	14.94	0.048	12	....	....	..	....	....	..	....	....	..
3413.569	15.16	0.519	08	14.99	....	..	14.99	0.503	14	....	....	..	....	....	..	....	....	..
3414.620	15.42	0.455	*23*	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
3415.489	15.37	0.210	04	14.79	....	..	15.47	0.210	*02*	....	....	..	....	....	..	....	....	..
" .531	15.42	0.252	*01*	14.89	....	..	15.37	0.252	*19*	....	....	..	....	....	..	....	....	..
" .572	15.42	0.293	*09*	14.89	....	..	15.61	0.293	*01*	....	....	..	....	....	..	....	....	..
" .614	15.21	0.335	*35*	14.94	....	..	15.21	0.335	*45*	....	....	..	....	....	..	....	....	..
3419.548	15.32	0.367	*27*	14.56	....	..	14.89	0.396	*82*	....	....	..	....	....	..	....	....	..
3422.494	14.89	0.527	02	14.66	....	..	14.56	0.022	*06*	....	....	..	....	....	..	....	....	..
" .591	14.71	0.066	03	14.66	....	..	14.94	0.119	*29*	....	....	..	....	....	..	....	....	..
3423.506	15.57	0.424	*07*	14.66	....	..	15.47	0.481	*11*	....	....	..	....	....	..	....	....	..
3666.649	14.56	0.013	*01*	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
3673.681	15.21	0.357	*37*	14.76	....	..	14.45	0.006	*06*	....	....	..	....	....	..	....	....	..
3693.638	15.3	0.250	..	14.66	....	..	15.1	0.044	..	....	....	..	....	....	..	....	....	..
3694.577	14.94	0.074	21	....	....	..	*15.1*	0.430	..	....	....	..	....	....	..	....	....	..
" .615	14.89	0.112	*06*	....	....	..	*16.4*	0.468	..	....	....	..	....	....	..	....	....	..
3695.519	15.42	0.459	*23*	....	....	..	*16.0*	0.265	..	....	....	..	....	....	..	....	....	..
" .561	15.61	0.501	15	15.04	....	..	15.57	0.307	*06*	....	....	..	....	....	..	....	....	..
" .602	14.66	0.542	03	14.89	....	..	*16.4*	0.348	..	....	....	..	....	....	..	....	....	..
" .644	14.56	0.027	*01*	14.71	....	..	*16.4*	0.390	..	....	....	..	....	....	..	....	....	..
3698.504	15.30	0.100	42	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
3699.499	14.94	0.538	24	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
" .542	14.71	0.023	14	14.89	....	..	*16.0*	0.415	..	....	....	..	....	....	..	....	....	..

J. D.	No. 81. Per. 0d.557332			No. 82. Per. 0d.556012			No. 83. Per. 0d.553310			No. 84. Per. 26d.5			No. 85. Per. 0d.527046			No. 86. Per. 0d.567901		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
3699.584	14.71	0.065	03	14.99	....	..	*16.0*	0.457	..	....	....	..	....	....	..	....	....	..
3713.513	14.84	0.061	17	14.99	....	..	14.56	0.553	07	....	....	..	....	....	..	....	....	..
" .680	15.42	0.228	04	14.99	....	..	16.0	0.167	..	....	....	..	....	....	..	....	....	..
3717.517	15.16	0.164	*03*	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
" .692	15.78	0.339	21	....	....	..	*15.6*	0.306	..	....	....	..	....	....	..	....	....	..
" .817	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
3724.535	15.64	0.494	07	14.89	....	..	14.89	0.509	17	....	....	..	....	....	..	....	....	..
" .676	14.66	0.077	*07*	14.79	....	..	15.21	0.097	08	....	....	..	....	....	..	....	....	..
3748.572	14.56	0.008	00	14.89	....	..	15.3	0.200	..	....	....	..	....	....	..	....	....	..
3775.556	15.37	0.240	*04*	14.66	....	..	15.11	0.072	11	....	....	..	....	....	..	....	....	..
3960.869	15.42	0.519	34	15.42	....	..	14.71	0.026	07	12.20	19.9	*40*	....	....	..	....	....	..
4014.745	15.67	0.334	11	....	....	..	....	....	..	12.73	20.7	16	....	....	..	....	....	..
4037.635	15.57	0.373	*03*	14.37	....	..	16.0	0.436	..	12.83	17.1	24	15.42	0.221	05	15.22	0.189	11
" .663	16.0	0.401	..	14.37	....	..	....	....	..	12.73	17.2	14	....	....	..	....	....	..
4041.675	15.42	0.512	22	14.71	....	..	14.76	0.049	*06*	12.73	21.2	20	14.56	0.045	01	14.99	0.254	*25*
4052.600	15.26	0.290	*25*	15.26	0.380	*05*	15.26	0.461	*42*	11.61	5.6	*06*	....	....	..	....	....	..
4058.548	14.82	0.108	*10*	15.42	0.212	29	15.58	0.323	*06*	12.10	11.5	*18*	....	....	..	....	....	..
" .662	15.06	0.222	*31*	15.26	0.326	*03*	15.58	0.437	*14*	12.10	11.7	*18*	15.06	0.167	*13*	15.06	0.204	*08*
" .780	15.42	0.340	*15*	....	....	..	14.71	0.001	21	12.04	11.8	*24*	15.58	0.285	05	15.26	0.322	*07*
" .854	15.47	0.414	*17*	14.82	0.518	06	15.42	0.075	39	12.10	11.9	*22*	....	....	..	....	....	..
4066.635	15.47	0.392	*15*	14.99	0.515	22	14.89	0.110	*32*	12.20	19.6	*40*	15.11	0.234	*31*	15.06	0.226	*13*
4067.636	15.21	0.278	*27*	15.21	0.404	*11*	14.40	0.004	*12*	12.20	20.6	*38*	15.06	0.181	*19*	14.82	0.092	04
4069.560	14.71	0.530	*12*	14.66	0.104	*20*	15.26	0.269	*33*	12.04	22.6	*21*	14.56	0.524	03	15.16	0.312	*16*
" .795	15.06	0.208	*27*	15.21	0.339	*09*	14.82	0.504	02	11.61	22.8	*54*	14.82	0.232	*59*	14.82	0.547	30
4070.655	15.16	0.511	*06*	14.61	0.087	*20*	15.26	0.257	*31*	11.61	23.7	*24*	14.56	0.037	02	15.06	0.271	*21*
4071.538	15.26	0.279	*23*	15.06	0.414	*25*	14.56	0.033	*15*	11.61	24.5	*02*	15.26	0.393	*34*	14.04	0.018	*40*
" .747	15.58	0.488	*04*	14.61	0.067	*15*	15.11	0.242	*43*	11.61	24.7	*01*	14.82	0.075	11	15.06	0.227	*13*
4072.538	15.06	0.164	*13*	....	....	..	15.42	0.480	*18*	11.34	25.5	*20*	....	....	..	....	....	..
" .745	15.58	0.371	*02*	....	....	..	15.06	0.134	*25*	11.61	25.7	07	....	....	..	....	....	..
4073.553	14.40	0.065	*27*	14.82	0.205	*29*	15.26	0.388	*45*	11.61	0.1	07	15.26	0.300	*29*	15.06	0.330	*28*
" .758	15.26	0.270	*21*	15.26	0.410	*06*	14.82	0.040	05	11.61	0.3	07	15.06	0.505	16	14.40	0.535	*28*
4074.561	15.06	0.515	*08*	14.66	0.101	*19*	15.26	0.290	*35*	11.61	1.1	06	15.06	0.254	*41*	14.89	0.202	*25*
4085.663	15.47	0.471	*18*	14.56	0.082	*14*	15.26	0.326	*39*	12.58	12.2	35	15.26	0.288	*27*	15.37	0.514	39
4086.608	15.47	0.301	*06*	....	....	..	15.58	0.164	17	12.10	13.1	*33*	....	....	..	....	....	..
4092.573	14.82	0.135	*25*	15.16	0.320	*13*	14.82	0.043	02	12.78	19.1	18	15.21	0.347	*38*	14.66	0.041	12
4093.532	14.66	0.537	*07*	14.56	0.167	*45*	15.58	0.448	*12*	12.58	20.0	*02*	15.11	0.251	*35*	15.11	0.432	*27*
" .762	15.37	0.210	04	....	....	..	....	....	..	12.58	20.3	*01*	....	....	..	....	....	..
4133.607	15.42	0.484	*21*	....	....	..	*16.0*	0.132	..	....	....	..	....	....	..	....	....	..
4147.519	15.47	0.463	*19*	15.47	0.221	33	15.37	0.211	*13*	....	....	..	....	....	..	....	....	..
4437.629	15.37	0.203	04	14.61	0.093	*22*	15.78	0.386	08	....	....	..	....	....	..	....	....	..
4795.632	15.61	0.399	*01*	....	....	..	*16.0*	0.398	..	....	....	..	....	....	..	....	....	..
4846.568	14.56	0.060	*10*	15.21	0.363	*09*	....	....	..	....	....	..	....	....	..	....	....	..
4860.582	15.42	0.141	31	15.78	0.477	56	14.99	0.057	10	....	....	..	....	....	..	....	....	..
4876.513	15.93	0.467	27	14.89	0.283	*37*	15.05	0.496	*15*	....	....	..	....	....	..	....	....	..
4886.535	15.78	0.457	12	....	....	..	14.66	0.005	15	....	....	..	....	....	..	....	....	..
5560.608	15.21	0.158	05	14.99	0.483	*21*	15.47	0.146	13	....	....	..	....	....	..	....	....	..
5562.605	15.78	0.483	15	15.42	0.256	21	15.83	0.483	28	....	....	..	....	....	..	....	....	..
5563.594	15.78	0.357	20	15.47	0.133	54	16.15	0.366	47	....	....	..	....	....	..	....	....	..
5579.551	14.99	0.152	*16*	14.66	0.522	*08*	15.37	0.277	*23*	....	....	..	....	....	..	....	....	..
5581.558	15.61	0.487	*01*	....	....	..	14.89	0.070	*10*	....	....	..	....	....	..	....	....	..

J. D.	No. 81. Per. 0d.557332			No. 82. Per. 0d.556012			No. 83. Per. 0d.553310			No. 84. Per. 26d.5			No. 85. Per. 0d.527046			No. 86. Per. 0d.567901		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
5899.564	15.73	0.256	29	14.85	0.272	*38*	15.42	0.476	*21*	12.24	24.1	51	15.04	0.097	21	14.99	0.539	38
5901.555	14.56	0.018	*01*	....	....	..	15.42	0.254	*15*	11.48	26.1	*06*	14.71	0.507	*14*	15.42	0.258	18
" .646	14.89	0.109	*04*	15.42	0.130	50	15.42	0.345	*26*	11.48	26.1	*06*	14.89	0.071	22	....	....	..
6633.655	15.83	0.341	26	....	....	..	....	....	..	12.73	16.2	15	....	....	..	....	....	..
6634.509	14.76	0.080	00	14.71	0.169	*32*	15.22	0.072	22	12.10	17.0	*49*	15.83	0.340	24	14.71	0.052	11
" .566	14.99	0.137	*09*	14.89	0.226	*25*	15.42	0.129	14	12.14	17.1	*45*	15.42	0.397	*18*	15.22	0.109	37
" .682	15.42	0.253	*02*	15.42	0.342	12	15.42	0.245	*12*	12.83	17.2	24	....	....	..	....	....	..
7021.639	15.73	0.422	09	14.99	0.315	*30*	15.42	0.439	*30*	11.48	6.6	*25*	14.66	0.091	*14*	....	....	..
7023.629	15.32	0.182	06	14.89	0.081	09	15.42	0.215	*09*	12.14	8.6	22	14.71	0.500	*30*	....	....	..
" .678	15.42	0.231	03	14.37	0.130	*55*	15.32	0.264	*26*	12.00	8.7	07	14.32	0.022	*19*	....	....	..
8157.558	15.57	0.498	04	14.99	0.301	*30*	15.83	0.412	12	11.38	3.1	*21*	....	....	..	14.27	0.558	*16*
9533.816	15.42	0.146	29	15.83	0.430	53	14.99	0.035	27	12.10	1.3	54	15.83	0.367	23	15.22	0.224	03
" .888	15.57	0.218	22	14.71	0.502	*12*	15.42	0.107	22	12.14	1.4	58	15.83	0.439	24	15.22	0.296	*08*
" .914	15.47	0.244	04	14.66	0.528	*07*	15.42	0.133	13	11.46	1.4	*10*	15.17	0.465	*34*	15.04	0.322	*29*
" .947	15.42	0.277	*06*	14.71	0.005	02	15.42	0.166	02	12.20	1.4	64	15.37	0.498	33	15.22	0.355	*15*
9537.761	15.42	0.190	14	15.22	0.483	03	15.04	0.107	*15*	12.04	5.3	38	14.89	0.095	07	14.99	0.194	*14*
" .786	15.42	0.215	08	14.79	0.508	*01*	15.42	0.132	12	12.04	5.3	38	15.22	0.120	26	14.99	0.219	*18*
" .812	15.42	0.241	00	14.71	0.534	*01*	15.42	0.158	04	11.48	5.3	*18*	15.22	0.146	14	14.99	0.245	*24*
" .836	15.42	0.265	*05*	14.89	0.002	20	15.42	0.182	*01*	11.44	5.3	*22*	15.22	0.170	01	15.32	0.269	05
" .874	15.42	0.303	*10*	14.99	0.040	27	15.42	0.220	*09*	11.48	5.4	*19*	15.42	0.208	08	15.42	0.307	10
" .899	15.83	0.328	28	14.99	0.065	23	15.57	0.245	02	11.48	5.4	*19*	15.73	0.233	31	15.42	0.332	08
" .924	15.73	0.353	15	15.22	0.090	40	15.73	0.270	14	12.00	5.4	33	15.73	0.258	25	15.83	0.357	46
" .950	15.73	0.379	12	15.27	0.116	39	15.73	0.296	11	11.48	5.5	*19*	15.73	0.284	20	15.73	0.383	34

J. D.	No. 87. Per. 0d.738373			No. 88. Per. 0d.493741			No. 89. Per. 0d.558430			No. 90. Per. 0d.557151			No. 91. Per. 0d.585855			No. 92. Per. not det'd.		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
1145.794	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
1148.796	14.94	0.051	11	....	....	..	....	....	..	....	....	..	14.56	0.126	*46*	....	....	..
1155.796	*14.9*	0.406	..	*14.9*	0.105	..	....	....	..	....	....	..	14.8	0.096	..	....	....	..
1161.809	15.1	0.512	..	15.1	0.193	..	15.3	0.159	..	....	....	..	....	....	..	....	....	..
1174.794	*14.9*	0.206	..	....	....	..	....	....	..	....	....	..	*14.9*	0.346	..	....	....	..
1178.785	*15.1*	0.505	..	15.0	0.382	..	....	....	..	*15.0*	0.385	..	14.66	0.236	*70*	....	....	..
1199.701	14.66	0.008	*13*	14.56	0.067	*56*	14.94	0.078	15	14.56	0.129	*44*	*15.3*	0.062	..	....	....	..
3346.540	15.42	0.397	21	....	....	..	15.42	0.312	*18*	15.42	0.265	03	....	....	..	....	....	..
3366.544	15.21	0.465	*05*	15.21	0.374	*13*	15.47	0.212	10	15.21	0.212	*09*	15.47	0.413	*02*	....	....	..
3369.698	14.66	0.666	*38*	14.71	0.072	*44*	14.66	0.016	09	....	....	..	14.89	0.052	23	....	....	..
3370.528	14.84	0.019	04	15.27	0.408	*10*	15.78	0.287	21	15.16	0.296	*26*	15.21	0.296	*23*	14.56	....	..
3371.529	14.99	0.281	*11*	15.11	0.422	*23*	15.21	0.171	00	15.16	0.183	*06*	14.89	0.125	*13*	....	....	..
3374.502	15.05	0.301	*07*	15.16	0.433	*16*	15.52	0.352	*12*	15.37	0.370	*09*	15.37	0.169	19	....	....	..
" .538	14.99	0.337	*16*	15.16	0.469	12	15.3	0.388	..	15.16	0.406	*31*	14.99	0.205	*29*	....	....	..
3376.502	14.89	0.086	01	14.89	0.458	*25*	15.16	0.119	18	15.37	0.141	31	15.52	0.411	03	13.83	....	..
" .543	14.89	0.127	*04*	14.99	0.005	09	15.37	0.160	21	15.42	0.182	21	15.83	0.452	35	14.27	....	..
" .584	15.21	0.168	23	15.21	0.046	21	15.47	0.201	14	15.47	0.223	14	15.11	0.493	*26*	....	....	..
" .677	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
3377.578	15.16	0.423	*07*	14.99	0.052	*04*	14.99	0.078	20	15.16	0.103	30	15.61	0.316	15	....	....	..
3378.579	14.99	0.686	03	15.05	0.066	*07*	14.94	0.520	11	14.27	0.547	*03*	15.47	0.145	37	....	....	..
3380.500	14.99	0.392	*21*	14.99	0.012	09	15.83	0.208	48	15.47	0.239	13	15.83	0.308	39	....	....	..
" .602	....	....	..	15.37	0.114	03	....	....	..	....	....	..	....	....	..	....	....	..
3390.604	15.05	0.159	08	14.94	0.241	04	15.16	0.260	*36*	....	....	..	15.16	0.453	*32*	....	....	..

J. D.	No. 87. Per. 0d.738373			No. 88. Per. 0d.493741			No. 89. Per. 0d.558430			No. 90. Per. 0d.557151			No. 91. Per. 0d.585855			No. 92. Per. not det'd.		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
3408.568	15.42	0.402	20	15.78	0.430	46	....	....	..	....	....	..	16.20	0.255	R	....	....	..
3409.544	14.99	0.639	*15*	15.47	0.419	11	15.47	0.213	13	15.47	0.311	04	15.47	0.060	79	....	....	..
" .623	14.99	0.718	16	15.42	0.004	52	15.73	0.292	16	15.78	0.390	32	15.47	0.139	40	....	....	..
3411.603	15.42	0.483	15	14.99	0.009	09	14.89	0.039	25	15.47	0.142	41	15.78	0.361	30	....	....	..
3412.560	15.05	0.702	16	15.47	0.472	46	15.83	0.437	13	14.27	0.542	*03*	15.73	0.146	62	14.27	....	..
3413.569	14.99	0.234	*05*	14.99	0.000	09	16.15	0.329	52	*16.4*	0.436	..	14.99	0.569	36	14.51	....	..
3414.620	....	....	..	....	....	..	....	....	..	....	....	..	15.16	0.449	*33*	....	....	..
3415.489	14.89	0.677	*10*	15.37	0.439	08	14.66	0.016	09	14.99	0.128	00	15.37	0.146	26	....	....	..
" .531	14.79	0.719	*04*	14.89	0.481	*07*	15.21	0.058	50	14.99	0.170	*17*	15.21	0.188	*02*	....	....	..
" .572	14.89	0.022	08	14.89	0.028	*02*	15.16	0.099	27	15.21	0.211	*09*	15.21	0.229	*12*	....	....	..
" .614	14.76	0.064	*08*	15.21	0.070	07	15.21	0.141	13	....	....	..	15.42	0.271	02	....	....	..
3419.548	15.16	0.306	04	14.94	0.054	*10*	15.21	0.166	03	16.0	0.287	..	14.94	0.104	04	....	....	..
3422.494	15.05	0.299	*07*	14.66	0.038	*28*	15.16	0.319	*45*	15.16	0.447	*28*	14.94	0.121	*07*	....	....	..
" .591	15.16	0.396	*04*	14.89	0.135	*48*	....	....	..	14.22	0.544	*08*	....	....	..	....	....	..
3423.506	15.21	0.572	*06*	14.89	0.062	*21*	15.21	0.214	*17*	14.99	0.345	*46*	14.66	0.547	*11*	....	....	..
3666.649	14.94	0.052	11	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
3673.681	15.32	0.439	08	15.83	0.404	46	....	....	..	....	....	..	15.78	0.562	112	....	....	..
3693.638	15.16	0.460	*10*	15.21	0.118	*13*	14.22	0.066	*51*	....	....	..	14.56	0.014	*05*	....	....	..
3694.577	15.16	0.660	10	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
" .615	14.89	0.698	*02*	15.11	0.108	*22*	....	....	..	....	....	..	....	....	..	....	....	..
3695.519	15.16	0.126	23	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
" .561	15.11	0.168	13	15.47	0.066	35	....	....	..	....	....	..	15.16	0.179	*05*	....	....	..
" .602	15.11	0.209	08	15.78	0.107	46	....	....	..	....	....	..	15.47	0.220	15	....	....	..
" .644	15.11	0.251	04	15.78	0.149	39	15.37	0.397	*31*	....	....	..	15.42	0.262	03	....	....	..
3698.504	15.16	0.157	20	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
3699.499	14.99	0.414	*23*	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
" .542	15.16	0.457	*09*	15.47	0.097	19	15.83	0.386	16	14.99	0.034	57	14.94	0.059	26	....	....	..
" .584	15.37	0.499	09	15.78	0.139	40	....	....	..	....	....	..	14.99	0.101	11	....	....	..
3713.513	15.11	0.399	*10*	14.66	0.243	*24*	....	....	..	....	....	..	....	....	..	....	....	..
" .680	15.05	0.566	*23*	14.99	0.410	*38*	....	....	..	....	....	..	14.89	0.137	*18*	....	....	..
3717.517	14.71	0.711	*15*	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
" .692	14.94	0.148	*02*	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
" .817	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
3724.535	15.01	0.345	*15*	15.37	0.403	*01*	15.37	0.250	*12*	14.22	0.512	*22*	15.42	0.446	*07*	....	....	..
" .676	15.16	0.486	*10*	14.99	0.050	*03*	15.73	0.391	06	15.16	0.096	35	14.66	0.002	06	....	....	..
3748.572	14.89	0.016	09	14.76	0.247	*13*	....	....	..	14.17	0.034	*25*	....	....	..	....	....	..
3775.556	15.21	0.418	*02*	14.94	0.075	*23*	15.64	0.454	*05*	15.21	0.275	*19*	14.56	0.498	*80*	14.89	....	..
3960.869	15.22	0.400	02	14.89	0.235	*03*	....	....	..	....	....	..	....	....	..	....	....	..
4014.745	15.16	0.375	*02*	....	....	..	14.99	0.076	21	....	....	..	....	....	..	....	....	..
4037.635	14.99	0.375	*20*	14.71	0.471	*30*	14.71	0.070	*04*	....	....	..	....	....	..	....	....	..
" .663	....	....	..	....	....	..	14.71	0.098	*17*	....	....	..	....	....	..	....	....	..
4041.675	14.76	0.723	*05*	15.22	0.068	10	15.22	0.201	*11*	....	....	..	....	....	..	....	....	..
4052.600	15.06	0.573	*21*	15.21	0.130	*16*	14.82	0.516	*13*	15.42	0.415	*05*	15.42	0.433	*07*	....	....	..
4058.548	15.06	0.614	*15*	15.26	0.153	*12*	15.47	0.322	*15*	15.58	0.234	24	15.58	0.522	52	14.40	....	..
" .662	14.82	0.728	02	14.71	0.267	*16*	15.58	0.436	*12*	15.58	0.348	13	14.82	0.050	16	15.26	....	..
" .780	14.94	0.107	03	15.16	0.385	*21*	14.40	0.554	*13*	15.26	0.466	*07*	15.06	0.168	*12*	....	....	..
" .854	15.06	0.181	05	15.06	0.459	*07*	14.82	0.069	08	14.40	0.540	09	15.06	0.242	*30*	....	....	..
4066.635	15.16	0.578	*11*	15.11	0.341	*10*	14.66	0.032	04	14.04	0.521	*32*	15.11	0.407	*38*	....	....	..
4067.636	14.99	0.103	09	15.06	0.354	*22*	15.58	0.475	*06*	15.26	0.408	*21*	14.94	0.236	*40*	15.16	....	..
4069.560	15.26	0.550	*02*	14.82	0.303	*13*	14.82	0.165	*36*	14.61	0.103	*25*	15.16	0.403	*33*	15.26	....	..

J. D.	No. 87. Per. 0d.738373			No. 88. Per. 0d.493741			No. 89. Per. 0d.558430			No. 90. Per. 0d.557151			No. 91. Per. 0d.585855			No. 92. Per. not det'd.		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
4069.795	14.82	0.047	*01*	14.61	0.044	*38*	15.26	0.400	*43*	15.58	0.338	14	14.40	0.052	*26*	....	....	..
4070.655	14.99	0.168	01	15.06	0.411	*31*	14.99	0.143	*10*	14.66	0.084	*07*	15.06	0.326	*41*	14.40	....	..
4071.538	15.06	0.313	*07*	14.82	0.306	*15*	15.37	0.468	*32*	15.06	0.410	*41*	14.40	0.037	*23*	14.40	....	..
" .747	15.26	0.522	*02*	14.56	0.021	*34*	14.82	0.118	*15*	14.61	0.062	04	15.06	0.246	*30*	15.06	....	..
4072.538	15.26	0.574	*01*	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
" .745	14.71	0.043	*11*	14.61	0.032	*32*	14.40	0.558	*13*	14.04	0.503	*47*	14.56	0.073	*17*	....	....	..
4073.553	14.89	0.113	*03*	15.06	0.346	*17*	15.21	0.249	*27*	15.06	0.196	*19*	15.06	0.295	*37*	15.26	....	..
" .758	15.11	0.318	*02*	14.71	0.058	*34*	15.58	0.454	*12*	15.42	0.401	*05*	15.42	0.500	08	....	....	..
4074.561	15.16	0.382	*04*	15.11	0.367	*22*	14.99	0.140	*08*	14.66	0.090	*11*	14.66	0.131	*39*	15.06	....	..
4085.663	15.26	0.409	04	15.06	0.113	*27*	14.89	0.074	12	14.82	0.049	33	14.66	0.102	*23*	....	....	..
4086.608	15.26	0.615	06	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
4092.573	15.06	0.673	05	15.06	0.110	*27*	15.58	0.282	02	....	....	..	14.66	0.567	03	15.26	....	..
4093.532	14.94	0.156	*02*	14.99	0.082	*23*	14.89	0.124	*12*	14.82	0.118	*11*	15.06	0.355	*42*	15.26	....	..
" .762	15.26	0.386	06	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
4133.607	15.21	0.359	04	15.11	0.164	*25*	14.56	0.551	04	....	....	..	14.61	0.006	01	14.12	....	..
4147.519	15.42	0.241	36	14.99	0.251	11	15.47	0.502	12	14.99	0.061	42	16.20	0.443	71	13.88	....	..
4437.629	14.89	0.171	*10*	15.11	0.041	14	15.78	0.229	35	14.99	0.453	*43*	15.47	0.555	77	14.12	....	..
4795.632	14.66	0.063	*18*	....	....	..	....	....	..	....	....	..	....	....	..	14.56	....	..
4846.568	14.71	0.051	*12*	15.37	0.163	01	15.61	0.397	*07*	15.78	0.443	33	14.66	0.567	03	14.56	....	..
4860.582	14.99	0.036	17	15.47	0.352	20	15.83	0.450	13	14.66	0.528	32	....	....	..	14.61	....	..
4876.513	15.21	0.461	*04*	14.99	0.483	02	15.42	0.187	14	15.47	0.302	04	14.61	0.048	*03*	14.17	....	..
4886.535	14.99	0.146	04	....	....	..	....	....	..	....	....	..	....	....	..	14.56	....	..
5560.608	14.89	0.085	01	15.11	0.253	23	....	....	..	....	....	..	....	....	..	14.51	....	..
5562.605	15.37	0.605	14	15.16	0.275	29	....	....	..	14.61	0.541	31	14.99	0.103	10	14.51	....	..
5563.594	14.99	0.117	07	14.89	0.277	02	15.83	0.399	15	....	....	..	15.57	0.507	27	14.27	....	..
5579.551	15.37	0.568	09	15.21	0.434	*10*	15.26	0.161	09	....	....	..	14.71	0.060	03	14.27	....	..
5581.558	15.16	0.360	*01*	....	....	..	15.47	0.493	*03*	14.66	0.551	36	15.83	0.309	39	14.27	....	..
5899.564	14.99	0.127	06	14.94	0.009	04	15.42	0.194	11	15.42	0.424	*04*	....	....	..	....	....	..
5901.555	15.12	0.642	*01*	15.04	0.025	13	15.73	0.510	61	15.42	0.186	20	....	....	..	....	....	..
" .646	14.89	0.733	09	15.73	0.116	39	14.51	0.042	*14*	14.99	0.277	*41*	....	....	..	....	....	..
6633.655	15.32	0.276	23	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
6634.509	15.22	0.391	02	14.99	0.268	13	15.42	0.245	*06*	14.27	0.486	*47*	....	....	..	14.07	....	..
" .566	15.22	0.448	*02*	15.42	0.325	34	15.42	0.302	*17*	14.17	0.543	*13*	....	....	..	....	....	..
" .682	15.32	0.564	04	14.99	0.441	*29*	....	....	..	....	....	..	....	....	..	....	....	..
7021.639	15.04	0.614	*17*	14.89	0.305	*08*	15.83	0.383	16	....	....	..	....	....	..	....	....	..
7023.629	15.12	0.389	*08*	14.99	0.320	*05*	14.89	0.139	*17*	14.89	0.158	*23*	....	....	..	14.27	....	..
" .678	15.22	0.438	*01*	15.42	0.369	09	15.42	0.188	14	....	....	..	....	....	..	14.27	....	..
8157.558	14.89	0.177	*10*	15.42	0.126	05	15.73	0.455	03	15.42	0.285	01	....	....	..	....	....	..
9533.816	14.89	0.107	*02*	15.42	0.328	32	15.32	0.183	06	15.83	0.380	37	....	....	..	....	....	..
" .888	14.99	0.179	*01*	15.83	0.400	45	15.42	0.255	*08*	15.83	0.452	41	....	....	..	....	....	..
" .914	14.99	0.205	*04*	15.27	0.426	*07*	15.37	0.281	*19*	....	....	..	15.42	0.487	00	....	....	..
" .947	15.12	0.238	07	15.42	0.459	28	15.42	0.314	*19*	14.61	0.511	17	....	....	..	....	....	..
9537.761	15.22	0.361	05	14.99	0.323	*08*	15.22	0.219	*17*	15.83	0.425	36	....	....	..	....	....	..
" .786	15.22	0.386	02	15.32	0.348	09	15.42	0.244	*06*	15.83	0.450	40	....	....	..	....	....	..
" .812	15.22	0.412	00	15.42	0.374	08	15.42	0.270	*11*	15.73	0.476	63	....	....	..	....	....	..
" .836	15.22	0.436	*01*	15.42	0.398	04	15.42	0.294	*16*	14.76	0.500	22	....	....	..	....	....	..
" .874	15.32	0.474	05	15.73	0.436	43	15.83	0.332	20	14.66	0.538	35	....	....	..	....	....	..
" .899	15.42	0.499	14	15.42	0.461	32	15.73	0.357	08	14.71	0.005	40	....	....	..	....	....	..
" .924	15.42	0.524	13	14.99	0.486	02	15.83	0.382	16	14.71	0.030	30	....	....	..	....	....	..
" .950	15.37	0.550	09	14.89	0.018	*01*	15.83	0.408	13	14.89	0.056	37	....	....	..	....	....	..

Remeasurements of the variables in Messier 5 were made only when the residuals from the smooth curve were 0.6 magn., or greater. It was found in the case of the variables in ω Centauri and Messier 3, that the remeasurements led to few essential modifications of the results previously obtained. To avoid the great labor of making many remeasures, therefore, the limit for the present discussion was placed at 0.6 magn., considerably larger than in the preceding clusters. The early X plates, made in 1889, were not remeasured in any case, since they were not in the stacks when the second measures were made. The results are contained in Table XXIV in the same form as those given for Messier 3 in Table XI of Part I. The first column gives the number of the variable, and the second column, the Julian date of the observation. The third column contains the magnitude of the variable as determined by the second measure. The fourth column gives the residual from the smooth curve, derived from the original measures found in Table XXIII, and repeated here for convenience, and the fifth column, the corresponding residual derived from the second measure. The sixth column contains the difference between the two magnitudes thus obtained. It should be equal to the difference between the corresponding residuals in the fourth and fifth columns, except for the accidental errors in reading the curves. When this difference amounts to 0.6 magn., or more, a third examination has been made and the result is given in the seventh column. The letter D indicates that the measurement presents such great difficulty that the result is very doubtful. 1 implies that the original measure, and 2, that the second measure, was more nearly correct. Many of the large residuals appear to be due to difficulties in the measurement of images which are poor and closely crowded, or to some form of photographic defect. The second measures were all made by Miss I. E. Woods.

TABLE XXIV

REMEASUREMENTS OF THE VARIABLES

No.	J. D.	Magn.	Res.	Res.	Diff.	R.	No.	J. D.	Magn.	Res.	Res.	Diff.	R.
	d.							d.					
2	3694.577	..	98	..	..	D	5	4086.608	14.92	76	62	14	..
"	3695.644	16.22	85	124	*39*	..	"	4147.519	16.12	65	57	08	..
"	9533.816	14.20	*64*	*110*	46	..	"	4860.582	16.18	63	61	02	..
4	4860.582	15.88	61	76	*15*	..	"	9537.874	16.22	92	63	29	..
5	3369.698	15.36	*70*	*23*	*47*	..	"	" .899	16.08	70	58	12	..
"	3408.568	15.88	97	148	*51*	1	"	" .924	16.42	68	127	*59*	1
"	3717.517	15.16	*78*	16	*94*	2	6	3717.517	14.72	*61*	*16*	*45*	..
"	" .692	..	*66*	..	..	D	"	5562.605	14.96	95	*24*	119	1

No.	J. D.	Magn.	Res.	Res.	Diff.	R.	No.	J. D.	Magn.	Res.	Res.	Diff.	R.
	d.							d.					
7	3698.504	14.72	64	47	17	..	37	3666.649	..	*114*	..	..	D
"	3717.517	15.16	*65*	*43*	*22*	..	"	3724.535	*16.3*	98	..	..	D2
9	3695.519	15.88	60	38	22	..	"	4037.635	15.60	*75*	*14*	*61*	2
"	4133.607	15.46	*92*	03	*95*	2	"	6634.509	15.20	*63*	*42*	*21*	..
12	3775.556	14.72	106	21	85	2	"	7021.639	15.30	*64*	*33*	*31*	..
13	3693.638	14.34	*61*	*69*	08	..	41	3419.548	16.30	76	64	12	..
14	4860.582	14.72	*67*	*51*	*16*	..	42	3377.578	12.68	60	45	15	..
16	4073.553	15.16	*64*	*14*	*50*	2	"	3380.500	12.88	63	68	*05*	..
18	4795.632	14.72	*62*	*56*	*06*	..	"	3415.489	11.26	66	*12*	78	2
"	4846.568	15.78	71	102	*31*	..	43	3694.615	16.08	67	82	*15*	..
"	4886.535	..	64	..	..	D	45	3666.649	..	63	..	..	D
"	5562.605	15.16	60	*02*	62	2	"	3717.817	..	*61*	..	..	D
"	5579.551	14.28	*114*	*118*	04	..	47	3699.542	16.08	60	58	02	..
20	4014.745	14.62	65	11	54	2	50	3390.604	13.82	64	29	35	..
24	3695.602	16.12	66	63	03	..	"	3408.568	13.08	69	04	65	2
"	" .644	15.48	65	*02*	67	2	"	4014.745	..	*72*	..	..	D
"	3717.517	14.96	*119*	*40*	*79*	2	56	3695.519	14.70	71	35	36	..
"	5563.594	16.22	75	82	*07*	..	58	3380.602	14.96	68	70	*02*	..
26	3415.614	15.16	60	03	57	2	"	3415.614	15.16	60	03	57	2
"	3717.817	..	*74*	..	..	D	65	3415.614	15.16	97	56	41	..
27	3346.540	15.48	125	100	25	..	"	3713.513	15.16	*60*	*33*	*27*	..
"	3376.677	..	65	..	..	D	"	4085.663	14.60	70	04	66	1
"	3409.544	15.46	88	56	32	..	"	9537.836	14.30	*60*	*62*	02	..
"	3411.603	14.96	70	*07*	77	2	69	4437.629	*16.3*	72	..	..	..
"	3666.649	..	*61*	..	..	D	71	6633.655	15.36	*68*	*03*	*65*	2
"	3717.517	15.06	*69*	*52*	*17*	..	72	4876.513	15.78	60	101	*41*	..
"	" .817	..	*64*	..	..	D	"	5579.551	15.16	*75*	*30*	*45*	..
"	4147.519	15.16	99	68	31	..	"	7023.678	15.68	87	108	*21*	..
"	4876.513	15.36	96	85	11	..	75	4846.568	15.48	60	40	20	..
"	5581.558	14.96	72	47	25	..	"	7023.629	14.96	*68*	*43*	*25*	..
"	9533.816	15.36	100	63	37	..	80	3409.623	15.46	62	61	01	..
"	" .888	15.88	65	70	*05*	..	83	3419.548	14.60	*82*	*111*	29	..
28	3698.504	14.92	*80*	*77*	*03*	..	84	9533.947	12.28	64	72	*08*	..
"	3717.517	14.96	*67*	*76*	09	..	89	5901.555	15.48	61	36	25	..
29	3414.620	14.72	*80*	*64*	*16*	..	90	9537.812	15.78	63	68	*05*	..
"	3415.531	14.62	*61*	*65*	04	..	91	3408.568	..	83	..	..	D
"	5581.558	15.16	60	65	*05*	..	"	3409.544	15.46	79	78	01	..
31	3666.649	15.78	64	64	00	..	"	3412.560	15.78	62	67	*05*	..
"	4037.663	14.72	*61*	*60*	*01*	..	"	3673.681	15.88	112	122	*10*	..
33	3369.698	15.26	*60*	*38*	*22*	..	"	3775.556	15.16	*80*	*20*	*60*	1
"	4014.745	14.96	*66*	*78*	12	..	"	4147.519	15.78	71	29	42	..
35	3960.869	15.16	64	53	11	..	"	4437.629	15.48	77	78	*01*	..

CHAPTER VII

THE ELEMENTS OF THE VARIABLES

Measures have been made of 92 stars in Messier 5 on 123 photographs. The periods of 72 of these are given in the following Table of Elements. Three of these variables, Nos. 42, 50, and 84, have periods of from 25 to 106 days and probably belong to a different class from the ordinary variables of short period found in globular clusters. They are much brighter than the other variables in this cluster and may not be real members of it, athough the presence of 3 variables in so small an area, less than one hundredth of a square degree, is unusual except in clusters. Of the remaining 20 stars, whose periods have not been found, the variability of 8 is doubtful, and special difficulties prevented the determination of the periods of the other 12 variables. The results obtained for Messier 5 appeared to present greater peculiarities and discordances than were present in ω Centauri and Messier 3. It was thought at first that this might be due to the fact that the measurements of these stars were among the earliest made, but further investigation appears to show that the result is due, in part at least, to the peculiarities of the variables themselves. Especially is this true of the variables having double maxima, of which 8 have been found in this cluster, Nos. 31, 35, 44, 62, 66, 79, 80, and 88. At first, no periods were found for these stars, since no period of the usual length of about half a day, with a single maximum and minimum, would satisfy the observations. It was later found, however, that periods of about one fourth of a day would lead to accordant results. The mean period of all the stars in the Table of Elements, excluding the three stars of long period, is $0^d.547$. The mean period, between successive maxima, of the eight stars referred to above is $0^d.271$. Aside from these eight stars, the shortest period found in this cluster is that of No. 4, $0^d.450$. Since, therefore, the mean period of 61 stars is a little over half a day, and of 8 stars, a little over a quarter of a day, with no connecting links between them, the conclusion seems natural that some direct relation must exist between the two periods. One explanation would be that each star, having a period of half the usual length, is a double variable formed of two components with alternating maxima. The real period of each component in this case would be twice as long as the apparent period. The results in Table XXV are given on this hypothesis. Attention may be

called to the fact, however, that if such a double variable were formed by the union of two variable stars of the ordinary brightness found in this cluster, the resulting star would be about 0.75 magn. brighter than either, unless the light of one were obscured by the other. The mean magnitude, however, of the 61 ordinary cluster variables, formed by taking the mean of the maximum and minimum brightness, is 14.95, of the 8 variables having double maxima, 14.98, or sensibly of the same brightness. Also, if composed of the same mass as a single star, a double star should be somewhat brighter, provided the surfaces were of equal luminosity. So many complications, however, might arise to modify the results, that no attempt is here made to do more than to state the facts in convenient form. The simple period between successive returns of maximum of these 8 stars can be found by dividing by two the periods given in the table.

Three periods found in Messier 5 are longer than a day: — No. 42, $25^d.74$; No. 50, $106^d.0$; and No. 84, $26^d.5$. Of the other 69 variables, whose periods have been determined, 2 have a period of $0^d.45$, expressed to the nearest hundredth, 3 of $0^d.46$, 4 of $0^d.47$, 2 of $0^d.48$, 8 of $0^d.49$, 8 of $0^d.50$, 2 of $0^d.51$, 1 of $0^d.52$, 4 of $0^d.53$, 4 of $0^d.54$, 4 of $0^d.55$, 7 of $0^d.56$, 3 of $0^d.57$, 0 of $0^d.58$, 3 of $0^d.59$, 3 of $0^d.60$, 1 of $0^d.61$, 3 of $0^d.62$, 0 of $0^d.63$ and $0^d.64$, 1 of $0^d.65$, 1 of $0^d.66$, 0 of $0^d.67$ and $0^d.68$, 1 of $0^d.69$, and 2 of $0^d.70$. Two longer periods were found, 1 of $0^d.74$ and 1 of $0^d.85$. In the above count, the double period has been used for stars of double maximum. With the single oscillation as the period, we should have 1 of period $0^d.23$, 4 of $0^d.25$, 1 of $0^d.28$, 1 of $0^d.31$, and 1 of $0^d.35$. These results are shown graphically in Fig. 7, Plate I, in which the first grouping is represented by closed dots. The positions, which the half periods of the stars of double maximum would have, are represented by crosses, the positions of these 8 stars when the periods are doubled, as they are used in the Table of Elements, by circles.

Irregularities in the form of the light curves may possibly be present, as well as secular variations in the length of the periods. These, however, have not been considered in Table XXV, in which the first column gives the number of the variable in the order of discovery. For each of the 8 variables having a double maximum, two lines are given on the assumption explained above that the star is composed of two variable components, having the same period and alternating maxima. These components are referred to as *a* and *b*. In no case is this duplicity apparent on the photograph. The positions of both, therefore, are the same. The second and third columns contain the rectangular coordinates, expressed in seconds of arc, and tenths, from the centre of the cluster as an origin. The fourth column gives the approximate distance from the centre in minutes of arc, and tenths. The fifth, sixth,

and seventh columns give the magnitudes at maximum and minimum, and the range. The two halves of the curves of the 8 stars having double maxima, as derived from the observations, though always similar, do not appear to be precisely equal. Whether the differences are due to the actual light changes, or to errors of measurement is in doubt. For the maximum and minimum values of the magnitude, the extreme values derived from the whole curve are given, and for the rates of increase and decrease mean values derived from both halves are given. The epoch of *b* is assumed to follow that of *a* by one-half the whole period of the star. Omitting the three variables of relatively long period, the mean magnitude of maximum is 14.43, the various values extending from 14.10 to 14.87, of minimum, 15.48, from 15.15 to 15.80, and of the range, 1.05, from 0.49 to 1.66 magn. The uniformity of these results is somewhat striking. The range of variation and hence the rate of change, given for Messier 5 in Table XXV, are considerably less than those found for the variables in Messier 3. This is probably due in part to the scale of magnitudes of the comparison stars used in Messier 3. More recent measures indicate that the scale for the fainter stars of the sequence was too open, and a new determination will probably be published later. The real range of variation of the variables in Messier 3, however, appears to be greater than that in either ω Centauri or Messier 5. The eighth, ninth, tenth, and eleventh columns give the duration of maximum, minimum, increase, and decrease. These values do not exactly correspond with those given under similar headings in H.A. **38**, page 136, and on page 61 of this volume. In most cases, there appears to be no real duration of maximum or minimum, since the light is constantly changing. The changes are generally slow, however, near maximum and preceding minimum. The quantities given under the headings Max. and Min. in the eighth and ninth columns of Table XXV are for the time during which the light, as derived from the curves given on page 165, is within one-tenth of a magnitude of maximum and minimum. The remaining time is divided between the increase and decrease, given in the tenth and eleventh columns. It is evident that the relative values of such readings will be affected by the range of variation and the form of the light curve. The twelfth and thirteenth columns give the maximum rate of increase and decrease in magnitudes an hour, derived graphically from tangents drawn to the light curves. They are expressed in magnitudes and tenths, and their value is only approximate. The greatest rate of increase appears to be about two and a half magnitudes an hour. The epoch is given in the fourteenth column and is the Julian date of the first computed maximum after Greenwich mean noon, January 1, 1900. The fifteenth column gives the period in days and decimals of a day, and the sixteenth column,

the period expressed in days, hours, minutes, and seconds. The mean period of all the variables in Messier 5 less than one day, is $0^d.546582$, or $13^h\ 7^m\ 4.^s7$. The mean period of all those found in Messier 3 is $0^d.54124$, or $12^h\ 59^m\ 23^s$, a difference of only about 8^m. In ω Centauri, periods less than 24^h were determined for 90 variables, the mean of which is $0^d.54859$, or $13^h\ 9^m\ 58^s$. These results are remarkably alike. In Messier 5, the whole period of the eight stars having double maxima is given, while in ω Centauri, all short periods were regarded as single. The number of returns of maximum between the first and last observations of Table XXIII is given in the seventeenth column. This number has been reckoned only between the extreme dates on which a precise determination of magnitude was possible. In many cases no such measurements were obtained on the early X plates made in 1889, since they do not show the variables when at minimum. The number of periods in such cases is considerably less. The interval covered by all the photographs is from 1889 to 1912. The average deviations of the observations from the smooth curve are given in the last column.

TABLE XXV

ELEMENTS OF THE VARIABLES

No.	X	Y	Dist.	Magnitude			Max.	Min.	Inc.	Dec.	Incr.	Decr.	Epoch	Period	Period			No. Periods	Mean Dev.
				Max.	Min.	Range													
	″	″	′										d.	d.	h.	m.	s.		
1	+ 28.3	+161.3	2.7	14.21	15.57	1.36	6	38	14	42	0.9	0.3	5021.106	0.521790	12	31	22.7	16083	14
2	−345.0	− 29.9	5.8	14.58	15.51	0.93	19	30	18	33	0.4	0.2	5021.508	0.526344	12	37	56.1	15881	17
3	+160.9	+113.1	3.3	14.68	15.54	0.86	14	35	9	42	0.7	0.1	5021.575	0.600184	14	24	15.9	13965	12
4	− 11.9	+ 74.2	1.3	14.20	15.53	1.33	7	39	10	44	1.6	0.3	5021.130	0.449632	10	47	28.2	18658	21
5	− 7.6	+ 52.0	0.9	14.29	15.60	1.31	13	33	12	42	0.9	0.3	5021.191	0.545903	13	6	6.1	15373	29
6	+ 27.1	− 46.3	0.9	14.20	15.20	1.00	8	36	8	48	1.0	0.3	5021.039	0.54883	13	10	18.9	15291	21
7	− 5.0	−191.4	3.2	14.26	15.80	1.54	8	35	11	46	2.1	0.3	5021.478	0.494383	11	51	54.7	16943	16
8	+134.3	−133.8	3.2	14.26	15.61	1.35	5	37	11	47	1.3	0.3	5021.205	0.546222	13	6	33.6	15364	15
9	+196.2	+ 87.3	3.6	14.40	15.50	1.10	12	30	9	49	1.0	0.1	5021.473	0.698894	16	46	24.5	11966	11
10	+107.9	+381.8	6.6	14.17	15.47	1.30	7	34	8	51	2.4	0.3	5021.353	0.530664	12	44	9.4	15796	13
11	−155.2	+ 85.3	3.0	14.13	15.42	1.29	8	37	7	48	1.2	0.3	5021.485	0.595894	14	18	5.2	14083	12
12	−175.9	− 16.2	2.9	14.20	15.76	1.56	8	31	11	50	1.5	0.3	5021.060	0.467722	11	13	31.2	17936	14
13	+ 11.8	− 65.4	1.1	14.20	15.26	1.06	9	38	14	39	0.5	0.2	5021.418	0.513121	12	18	53.7	16356	19
14	−146.4	+104.7	3.0	14.50	15.41	0.91	15	35	15	35	0.5	0.2	5021.466	0.487240	11	41	37.5	17218	15
15	+193.2	+ 2.9	3.2	14.79	15.30	0.51	26	35	13	26	0.2	0.1	5021.372	0.507743	12	11	9.0	16528	15
16	+ 91.6	+ 83.7	2.1	14.20	15.50	1.30	12	30	8	50	1.0	0.2	5021.366	0.647622	15	32	34.5	12943	15
17	− 27.7	+ 43.7	0.9	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
18	+151.9	−108.8	3.1	14.60	15.48	0.88	13	43	10	34	1.7	0.2	5021.436	0.464007	11	8	10.2	18080	19
19	+237.0	−130.8	4.5	14.30	15.75	1.45	12	29	13	46	1.9	0.4	5021.034	0.469952	11	16	43.8	17858	16

No.	X	Y	Dist.	Magnitude			Max.	Min.	Inc.	Dec.	Incr.	Decr.	Epoch	Period	Period			No. Periods	Mean Dev.
				Max.	Min.	Range													
	"	"	'										d.	d.	h.	m.	s.		
20	−256.9	− 23.7	4.3	14.30	15.31	1.01	9	34	11	46	0.6	0.2	5021.537	0.609480	14	37	39.1	13743	12
21	+324.1	+ 72.8	5.5	14.54	15.48	0.94	17	39	6	38	1.4	0.2	5021.469	0.604894	14	31	2.8	13847	11
22	−206.2	+384.2	7.3	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
23	−254.6	− 9.6	4.2	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
24	− 46.8	− 71.5	1.4	14.40	15.50	1.10	7	44	12	37	0.8	0.3	5021.398	0.478377	11	28	51.8	17482	19
25	− 29.6	−127.9	2.2	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
26	+ 22.2	+101.8	1.7	14.34	15.40	1.06	10	37	6	47	1.1	0.2	5021.591	0.622562	14	56	29.4	13480	17
27	− 6.6	− 58.9	1.0	14.48	15.58	1.10	18	33	12	37	1.2	0.2	5021.381	0.470328	11	17	16.3	17837	27
28	+132.9	−121.8	3.0	14.45	15.72	1.27	10	33	7	50	1.4	0.2	5021.460	0.543948	13	3	17.1	15429	17
29	−376.0	− 75.1	6.4	14.50	15.49	0.99	14	35	10	41	1.7	0.3	5021.339	0.451435	10	50	4.0	18590	17
30	+ 23.3	−213.0	3.6	14.60	15.50	0.90	12	32	6	50	0.8	0.1	5021.307	0.592177	14	12	44.1	14167	13
31, *a*	+152.0	−142.5	3.5	14.66	15.38	0.72	24	28	25	23	0.4	0.5	5021.193	0.461937	11	5	11.4	18160	17
31, *b*	"	"	"										" .424	"	"	"	"	"	
32	+202.7	−151.7	4.2	14.16	15.60	1.44	8	37	10	45	1.7	0.4	5021.220	0.457787	10	59	12.8	18326	13
33	− 21.1	+127.8	2.2	14.34	15.75	1.41	7	36	10	47	1.5	0.3	5021.296	0.501472	12	2	7.2	12346	12
34	+ 84.8	+ 59.2	1.7	14.41	15.48	1.07	11	29	12	48	0.8	0.2	5021.425	0.568140	13	38	7.4	14754	14
35, *a*	− 12.1	−114.7	1.9	14.62	15.23	0.61	28	30	21	21	0.3	0.3	5021.096	0.616770	14	48	8.9	13602	16
35, *b*	"	"	"										" .404	"	"	"	"	"	
36	− 7.5	− 51.7	0.9	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
37	+ 44.7	− 67.2	1.3	14.10	15.76	1.66	7	37	9	47	2.2	0.4	5021.256	0.488794	11	43	51.8	12626	19
38	− 44.0	+117.2	2.1	14.34	15.51	1.17	6	37	9	48	1.2	0.3	5021.414	0.470439	11	17	25.9	17832	14
39	−126.1	−249.5	4.7	14.13	15.57	1.44	10	31	9	50	1.0	0.2	5021.512	0.589033	14	8	12.4	14242	13
40	+125.5	+113.2	2.8	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
41	+ 19.5	+231.4	3.9	14.10	15.68	1.58	10	42	11	37	1.6	0.4	5021.279	0.488578	11	43	33.1	17171	12
42	−123.8	−120.1	2.9	11.20	12.24	1.04	19	27	10	44	..	..	5032.48	25.74	R	..	..	326	15
43	−202.7	+155.1	4.3	14.68	15.43	0.75	21	28	11	40	0.4	0.1	5021.122	0.660235	15	50	44.3	12661	11
44, *a*	−102.8	+ 31.0	1.8	14.66	15.23	0.57	30	27	23	20	0.4	0.3	5021.240	0.495797	11	53	56.9	16920	13
44, *b*	"	"	"										" .488	"	"	"	"	"	
45	−117.5	+ 65.9	2.2	14.37	15.40	1.03	11	28	9	52	0.8	0.1	5021.080	0.616637	14	47	57.4	13605	16
46	− 80.2	+ 69.6	1.8	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
47	− 75.4	+ 58.2	1.6	14.28	15.78	1.50	7	23	10	60	1.1	0.2	5021.050	0.539725	12	57	12.2	15530	18
48	− 62.8	+106.4	2.1	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
49	+ 53.1	+177.4	3.1	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
50	+ 38.5	+109.5	1.9	13.00	14.20	1.20	16	25	15	44	..	..	5101.0	106.0	R	..	..	79	18
51	− 0.1	+136.2	2.3	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
52	+108.7	+ 35.0	1.9	14.25	15.40	1.15	12	41	6	41	1.5	0.2	5021.216	0.501790	12	2	34.7	16593	14
53	+ 68.8	+ 19.2	1.2	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
54	+ 27.1	+ 56.8	1.0	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
55	+ 80.3	−163.1	3.0	14.75	15.25	0.50	15	52	9	24	0.4	0.1	5021.106	0.490737	11	46	39.7	17095	14
56	− 68.8	+ 96.9	2.0	14.34	15.60	1.26	7	32	13	48	0.9	0.3	5021.015	0.534690	12	49	57.2	15689	16
57	− 30.3	+ 99.7	1.7	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
58	−608.	+163.	10.5	14.10	15.56	1.46	6	30	16	48	0.9	0.4	5021.467	0.491580	11	47	52.5	17066	18
59	−150.9	− 34.8	2.6	14.26	15.44	1.18	5	43	9	43	0.9	0.3	5021.229	0.542025	13	0	31.0	15423	12
60	−110.1	+ 8.6	1.8	..	..	..	..	..	..	..	..	..	....	....	..	..	..	..	..
61	−255.7	− 30.2	4.3	14.46	15.52	1.06	10	44	10	36	0.7	0.2	5021.298	0.568613	13	38	48.2	14664	13
62, *a*	+167.6	−217.9	4.6	14.70	15.34	0.64	29	24	18	29	0.5	0.3	5021.244	0.562815	13	30	27.2	14905	11
62, *b*	"	"	"										" .525	"	"	"	"	"	
63	+214.0	+ 50.6	3.7	14.23	15.57	1.34	8	38	14	40	0.8	0.3	5021.412	0.497677	11	56	39.3	16755	15
64	− 51.6	−249.2	4.2	14.40	15.70	1.30	10	38	7	45	1.3	0.3	5021.000	0.544510	13	4	5.7	15313	13
65	−160.7	− 93.6	3.1	14.36	15.52	1.16	18	28	8	46	1.6	0.2	5021.057	0.480665	11	32	9.5	17427	24

No.	X	Y	Dist.	Magnitude Max.	Magnitude Min.	Magnitude Range	Max.	Min.	Inc.	Dec.	Incr.	Decr.	Epoch	Period	Period	No. Periods	Mean Dev.
	″	″	′										d.	d.	h. m. s.		
66, *a*	+219.7	+405.9	7.7	14.69	15.18	0.49	38	25	14	23	0.3	0.1	5021.194	0.702102	16 51 1.6	11948	13
66, *b*	〃	〃	〃										〃 .545	〃	〃 〃 〃	〃	
67	−102.3	− 60.	17.1	..	..	..	..	..	..	..	..	..	....	....	.. .. ..	..	..
68	+896.	+ 50.	15.0	14.75	15.23	0.48	25	31	12	32	0.2	0.1	5021.217	0.502136	12 3 4.6	13931	14
69	+654.	+751.	16.6	14.17	15.44	1.27	12	40	10	38	1.5	0.3	5021.205	0.494876	11 52 37.3	14163	15
70	+393.	+626.	12.3	14.40	15.50	1.10	11	40	11	38	0.8	0.3	5021.153	0.558520	13 24 16.1	12525	15
71	+661.	+292.	12.0	14.26	15.60	1.34	10	40	8	42	1.8	0.4	5021.027	0.502468	12 3 33.2	9575	15
72	+689.	+ 38.	11.5	14.59	15.49	0.90	14	33	7	46	0.9	0.2	5021.455	0.562108	13 29 26.1	12378	14
73	+ 18.3	+605.0	10.1	..	..	..	..	..	..	..	..	..	....	....	.. .. ..	..	..
74	+205.6	+162.2	4.4	..	..	..	..	..	..	..	..	..	....	....	.. .. ..	..	..
75	+ 78.6	−413.8	7.0	14.70	15.40	0.70	14	31	9	46	0.4	0.1	5021.501	0.686880	16 29 6.4	12303	17
76	+ 80.9	−309.8	5.3	..	..	..	..	..	..	..	..	..	....	....	.. .. ..	..	..
77	−172.7	−184.5	4.2	14.50	15.27	0.77	12	16	16	56	0.2	0.1	5021.108	0.845110	20 16 57.5	9927	13
78	+ 65.7	+159.4	2.9	..	..	..	..	..	..	..	..	..	....	....	.. .. ..	..	..
79, *a*	−134.3	− 31.7	2.3	14.60	15.15	0.55	29	31	15	25	0.4	0.3	5021.089	0.499785	11 59 41.5	16785	11
79, *b*	〃	〃	〃										〃 .339	〃	〃 〃 〃	〃	
80, *a*	− 48.7	+111.8	2.0	14.73	15.25	0.52	20	30	17	33	0.4	0.2	5021.059	0.503260	12 4 23.7	16610	15
80, *b*	〃	〃	〃										〃 .311	〃	〃 〃 〃	〃	
81	− 72.5	−121.5	2.4	14.57	15.65	1.08	14	30	8	48	0.9	0.2	5021.510	0.557332	13 22 33.5	11109	13
82	− 68.3	+ 13.1	1.2	14.69	15.31	0.62	23	40	5	32	0.8	0.1	5021.349	0.556012	13 20 39.4	9866	23
83	− 84.9	− 87.6	2.0	14.50	15.70	1.20	10	36	7	47	1.4	0.3	5021.538	0.553310	13 16 46.0	15108	17
84	+ 43.0	− 32.8	0.9	11.54	12.61	1.07	22	28	12	38	..	..	5027.5	26.5	R	211	24
85	+ 37.9	− 35.1	0.9	14.50	15.60	1.10	11	44	5	40	1.9	0.2	5021.409	0.527046	12 38 56.8	10436	21
86	+ 34.7	− 31.6	0.8	14.40	15.40	1.00	9	31	15	45	0.6	0.2	5021.050	0.567901	13 37 46.6	9685	20
87	+122.3	− 2.3	2.0	14.80	15.29	0.49	19	33	10	38	0.2	0.1	5021.511	0.738373	17 43 15.4	11361	09
88, *a*	+ 65.4	+ 61.4	1.5	14.87	15.38	0.51	28	36	16	20	0.3	0.3	5021.189	0.493741	11 50 59.2	16888	20
88, *b*	〃	〃	〃										〃 .436	〃	〃 〃 〃	〃	
89	+ 60.4	+ 64.3	1.5	14.53	15.70	1.17	11	31	10	48	1.1	0.2	5021.518	0.558430	13 24 8.4	14931	17
90	− 44.8	+ 15.3	0.8	14.31	15.47	1.16	13	38	10	39	1.1	0.3	5021.070	0.557151	13 22 17.8	14966	24
91	− 35.9	+ 35.5	0.8	14.60	15.49	0.89	16	39	11	34	0.6	0.2	5021.172	0.585855	14 3 37.9	14312	26
92	− 57.0	−122.5	2.3	..	..	..	..	..	..	..	..	..	....	....	.. .. ..	..	..

REMARKS

1. The period given in the table satisfies the observations well.
2. The period given in the table satisfies the observations fairly well, but there are numerous large residuals from the smooth curve drawn through the observations, which in part appear to be systematic. It is possible that the assumption of a secular variation in the length of the period would improve the results, but no more satisfactory simple period has been found than that given in the table.
3. The period given satisfies the observations well. The period is rather long, and the range, rather small.
4. The period given is probably about right, in spite of numerous large residuals. These appear, however, to be due in general to accidental errors. The star is near the centre of the cluster and therefore difficult to measure on many plates. This star has the shortest period found in Messier 5, if we regard the double oscillation in the light curves of such variables as No. 62 as caused by the variations in light of two connected variable stars, each of whose periods is that given in the table. See the remarks on page 177, and on page 162 under No. 62.
5. This variable is near the centre of the cluster and is a difficult object on many of the measured plates, its image

being often confused with those of adjacent stars. The period is probably about right although there are many very large residuals from the smooth curve. These appear to be due to accidental errors, as is well shown in the measurements of J. D. 9537, and elsewhere.

6. The period given in the table is probably about right, although the residuals are large. They appear, however, to be due to the accidental errors of measurement, as the star is close and difficult.
7. The elements given in the table appear to be good.
8. The period given in the table is satisfactory. There are a few large residuals, which are probably due to accidental errors of measurement.
9. The period of this star satisfies the observations well. There are a few large residuals, which appear to be due to accidental errors.
10. The period given in the table satisfies the observations well, although there are a few large residuals.
11. The period given in the table satisfies the observations well.
12. The elements of this star appear to be satisfactory.
13. The period of this star is probably about right, although there are many large residuals from the smooth curve. The star, however, is a component of a close double, and exact measurements are difficult, and on some plates, impossible.
14. The period given in the table appears to be about right, although there are some large discordances.
15. The range of variation of this star is small, about half a magnitude, and the results somewhat discordant. The period may be in error.
16. The given elements satisfy the observations well, although there are a few large residuals from the smooth curve.
17. This star is near the centre of the cluster and is a very close and difficult object on most of the measured plates. The measures in many cases are evidently unreliable. The period $0^d.60186$ satisfies a large part of the observations as well, perhaps, as could be expected under the circumstances. There are so many discordances, however, that this period has not been included in the Table of Elements.
18. The period given is not satisfactory, although it appears to be about right. No better period has been found, nor any good explanation of the large discordances which result from the use of the assumed period.
19. The elements given satisfy the observations well. It is a good example of a cluster variable having a large range of variation, a short period, and extremely rapid increase and decrease in light.
20. The elements given satisfy the observations well.
21. The elements given in the table satisfy the observations well.
22. This star is faint. It appears to vary slightly in brightness, but the variation, if genuine, is so small that no attempt has been made to determine the period.
23. This star appears to vary slightly in brightness, but the variation, if genuine, is so small that no attempt has been made to determine the period.
24. The period given is probably about right. There are a number of large residuals from the smooth curve, but these appear to be due to the difficulties of measurements.
25. This star is always comparatively bright. It appears to vary slightly, but the variation, if genuine, is so small, that no attempt has been made to determine the period.
26. The period of this star is doubtless about right, although there are many rather large residuals from the smooth curve. These appear, however, to be due to the accidental errors of measurement.
27. This star is near the centre of the cluster and is a difficult object for measurement except on the best plates. The measurements are obviously inexact on many plates, as is shown in the case of those of J. D. 3695, and J. D. 3717, where they would not agree well with any short period whatever. In spite of the frequent large residuals from the smooth curve, however, the period given in the table is perhaps about right.
28. The elements given in the table appear to be satisfactory.
29. This star has one of the shortest periods found in the cluster. The elements given in the table appear to be fairly satisfactory, but the accordance of the results is considerably increased by the use of the formula: — J. D. $2415021.358 + 0^d.451435\,E + 0^d.04 \sin (0°.0428\,E + 96°.7)$. For dates which precede J. D. 2415021, E is to be regarded as negative.
30. The elements of this variable given in the table appear to be fairly satisfactory.
31. This appears to be a case of a double variable. The full period is perhaps $0^d.461937$, although the apparent period is one half as great. See remarks on page 177, and on page 162, under 62.
32. This star is one of the most striking variables in the cluster. The period is short, and the range of variation large. The rate of increase is extremely rapid, and that of decrease, though slower than that of increase, is nevertheless rapid. This is well shown on the plates of J. D. 3374, where an apparent minimum is followed by a maximum in 52 minutes. There appears to be no duration of the maximum light. Indeed, the true brightness at maximum is somewhat reduced by the necessary duration of the photographic exposure, which is, in general, a little less than one hour. This would be a good star for a more careful study.
33. This star is one of the most interesting variables in the cluster. The period is only a trifle more than half a day, so that the same phase is repeated at nearly the same time on successive nights. The changes of light are rapid. No precise measurements of the variable were obtained from the early plates made between J. D. 1141 and J. D. 1199, since during that time at the hour when the plates were taken the star was always at, or near, its minimum phase. The early Mount Wilson plates show the variables well only when they are at, or near, maximum brightness. On June 14, 1901, visual observations of this star were made by Professors E. C. Pickering and J. A. Parkhurst with the forty-inch Yerkes telescope. These observations indicated a maximum at $20^h\,30^m$, Greenwich Mean Time,

or J. D. 5551.850. The photographic maximum occurred, according to the elements given in the table, at J. D. 5551.854, or 5.6 minutes later. The period given in the Table of Elements agrees closely with that determined from visual observations with the 40-inch Yerkes Refractor by Professor E. E. Barnard. See A. N. **184**, 273.

34. The elements given in the table for this star satisfy the observations fairly well.

35. This appears to be another case of the double oscillation in the light curve, due to the presence of two variable stars. See remarks on page 177 and on page 162 under 62.

36. This star is very close and difficult. The light of another star has been measured with it. The measurements make the variability sure, but the accidental errors appear to be so large that no attempt has been made to determine the period.

37. The period given in the table satisfies the observations fairly well with a few exceptions. As the star has a close, bright companion and shows a distinct image only on the best plates, measures are difficult, and the large residuals may readily be due to accidental errors. The range of variation is large and the rate of increase and decrease very rapid. This star was too difficult for measurement on the early plates.

38. The elements of this star given in the table appear to be satisfactory. The range is large, and the changes in brightness, rapid. The period appears to be uniform.

39. The elements of this star are satisfactory.

40. This star appears to have a period of about $0^d.634032$ with a double oscillation in the light curve like that of No. 62. See page 177, and page 162 under 62. The observations agree well with this assumption for long intervals, as for all the measures of J. D. 3346 to J. D. 3423, for those of J. D. 4052 to J. D. 4093, etc., but this period does not satisfy the entire interval covered by all the observations. For this reason, it has not been included in the Table of Elements. Improved accordance can be obtained by the use of an empirical secular correction, obtained in the manner described in Chapter 3. The curve thus obtained for this variable is not a sine curve, and has not been employed, since it seems very doubtful whether it offers the true explanation for the large discordances which are found with the period indicated above.

41. This star is one of the most striking variables in the cluster. The range of variation is large and the changes in brightness extremely rapid. The elements given in the table are satisfactory.

42. This is the brightest variable and one of the brightest stars in the cluster. The period is so long as to give rise to the suspicion that this star belongs to a different subclass from the other cluster variables. It may not be a real member of the cluster. The form of the light curve, however, appears to be about the same as that of the variables of shorter period. The maximum rate of increase in light is about 0.029 magn. per hour, and of decrease, 0.004. The period is $25^d\ 17^h\ 45^m.6$.

43. The elements given in the table seem to be satisfactory. The period is rather long, and the range of variation, rather small.

44. This star is another case of a double variable, having an apparent period of $0^d.247898$. The full period has been assumed to be twice as great. See remarks on page 177, and on page 162, under 62.

45. This star is rather difficult, and the range of variation is small. The elements given in the table, however, appear to be very satisfactory, although there are a few large residuals from the smooth curve.

46. The variability of this star is doubtful. At least, if genuine, the range of variation is very small, so that no attempt has been made to determine the period.

47. The elements of this star given in the table appear to be very satisfactory.

48. The variability of this star is doubtful. It appears to be unusually faint on a few plates, especially on that of J. D. 3376.581, but these few differences may be due to defects on the plates. No attempt has been made to determine a period.

49. The variability of this star is doubtful. The differences in the measured magnitudes are perhaps no greater than are to be expected from the accidental errors of measurement.

50. The elements given in the table appear to satisfy the observations fairly well, but there are some large discordances. The star is one component of a close double, and measures on many plates were difficult. The period, $106^d.0$, is remarkably long compared with those of the other variables in the cluster. It agrees well, however, with the period obtained by Professor E. E. Barnard from visual observations. The maximum rate of increase is about 0.004 magn. per hour, and of decrease, 0.001. The period is $106^d\ 0^h\ 0^m$.

51. This star, which is one component of a close double, was suspected of variability, but the measurements do not appear to confirm it. At any rate, the changes are so small that no attempt has been made to find a period.

52. The period seems to satisfy the observations fairly well, except that at J. D. 1161.809.

53. This star was a suspected variable. It is a close and difficult object, and the occasional large differences in the measured magnitudes may be due to accidental errors in measurement. No attempt has been made to determine a period.

54. This star appears to undergo large changes in brightness. It is, however, a very close and difficult object. On many plates its image is confused with those of two or more other stars. The measurements appear to be very unreliable, and the determination of the period very difficult. There are indications of a period of about $0^d.45$.

55. The period given in the table seems to satisfy the observations fairly well. The range of variation, however, is small, so that the determination of the precise period is difficult, and the results may be regarded as somewhat doubtful.

56. The elements given for this star appear to be good. An error in the identification of this variable was at first made on plates from J. D. 1145 to J. D. 3790, which caused trouble in the determination of the period until this fact was found out and the measures were repeated.

57. The real range of variation of this star is probably small, although the range indicated by many of the measurements is large. The star is, however, very close to another star, so that the images of the variable and the other star coalesce on many plates. On this account the measured magnitudes are doubtless very inaccurate in many cases, so that the real light changes are obscured. At least no satisfactory period has been found.
58. This star is distant from the centre of the cluster. The range of variation is large. The elements given in the table appear to be satisfactory.
59. The period given in the table satisfies all the observations exceptionally well.
60. This star is a close and difficult object. The range of variation, also, is small, so that the determination of the period is difficult. There are indications of a period of about $0^d.45$.
61. The elements given in the table appear to be good.
62. The light curve of this star has a double oscillation during the given period. It has been assumed that this is caused by a double system, consisting of two variable components, having the same period and alternating maxima. Eight such variables have been found in this cluster, Nos. 31, 35, 44, 62, 66, 79, 80, and 88, and it is possible that additional stars in this, or other clusters, whose results give large discordances without apparent cause, may belong to the same class. The determination of the periods of these stars presented difficulties at first, owing to their unusual nature, until it was found out that the returns of maximum occurred at about half the usual interval of time. In the case of 62, the two halves of the light curve appear to be nearly equal, but in other cases they may be somewhat unequal. For a special study of this variable, see page 177.
63. The elements given in the table appear to be satisfactory.
64. The elements given in the table appear to be satisfactory.
65. The period given in the table is probably about right, although many large residuals from the smooth curve occur. The star has a very close companion, and the two images coalesce on many plates, so that exact measures are impossible.
66. This star is rather distant from the comparison stars, and the range of variation is small. If the elements given in the table are correct, it is an extreme case of the double period. $0^d.702102$ is the longest period yet found for a variable of this class. The two halves of the light curve seem nearly, or quite, equal.
67. This star is the most distant variable found in the cluster. In Volume 38 of these Annals, by a typographical error, its coordinate in X is given as $102.''3$, instead of $1023''$. The star appears to vary somewhat, but in general the range indicated by the measurements is so small that the determination of a period would be difficult and has not been attempted. Not shown on Plate 8, Fig. 2, in H.A. 38.
68. This star is distant from the centre of the cluster and does not appear on Plate 8, Fig. 2, in H.A. 38. The range of variation is small and the measures difficult on account of its distance from the comparison stars. On this account there is considerable discordance, but the given period is probably about right. It could not be safely measured on the Mount Wilson plates on account of its great distance from the centre.
69. The elements appear to be satisfactory. The range in brightness is large. This star is distant from the centre of the cluster and does not appear on Plate 8, Fig. 2, in H.A. 38.
70. The elements appear to be fairly good. The star is remote from the centre of the cluster and does not appear on Plate 8, Fig. 2, in H.A. 38.
71. The elements of this star appear to be satisfactory.
72. The period of this variable seems to be right, though some of the residuals from the smooth curve are very large. This star is distant from the centre of the cluster and from the comparison stars.
73. This star is distant from the centre of the cluster and does not appear on Plate 8, Fig. 2, in H.A. 38. From the measurements of photographs made between J. D. 4052 and J. D. 4093, the period appears to be a trifle more than half a day. The range of variation is so small, however, that the real changes are probably marked by the accidental errors of measurement, so that no period has been determined. It is possible that this star has a double maximum, like No. 62, or other peculiarities.
74. This star is a close double, whose components are not well separated even on the best plates. The component nearer the centre of the cluster is the variable. The measurements include the images of both stars, and hence, the resulting measures do not give the true range of variation of the variable itself. No period has been determined. A series of short exposures would probably show the components separated, so that better results could be obtained.
75. The period given in the table is probably about right, although there are many large deviations from the smooth curve, and some error or complication may be present. The star is distant from the comparison stars.
76. The variability of this star appears to be confirmed, but the range is so small that no attempt has been made to find the period.
77. The period given satisfies the observations fairly well. This is the longest period, less than one day, of any variable found in this cluster.
78. The range of variation of this star is very small. The determination of the period would be difficult and has not been attempted, since in many cases the real light changes appear to be obscured by the accidental errors of measurement.
79. The light curve of this star appears to be like that of No. 62, having a double maximum. See remarks under No. 62, and on page 177.
80. The light curve of this variable also appears to be like that of 62, but it presents some irregularities. The star is especially well placed for measurement and the observations should yield accordant results. Various large discordances occur, however, which may indicate either an error in the period, or the need of a secular correction like that found for No. 62. See page 177.

81. The elements of this star are satisfactory.
82. This variable has a close companion, so that the measurements are trustworthy only on the best plates. On this account the early plates have not been included in the discussion, which makes use only of those from J. D. 4052 to J. D. 9537. The period given in the table is probably about right.
83. This star is close and difficult, but the period given in the table is probably about right.
84. This is a close and difficult object, permitting even approximate measures only on a few of the best plates. The star is rather bright. The period determined by Professor Barnard in 1898 by visual observations, $26^d.2$, appears to be about right. The period $26^d.5$ satisfies the photographic observations somewhat better, and has been accepted in the Table of Elements. The maximum rate of increase of light is about 0.017 magn. an hour, and that of decrease, 0.006. The period is $26^d\ 12^h\ 0^m$.
85. This is a difficult star, and measurements were possible only on the best plates. The period given in the table is probably about right.
86. This star, like the two preceding, is close and difficult. Measurements were made only on the best plates. The period given in the table is based on these and appears to be right.
87. The elements given for this star seem to be good. The range of variation is unusually small, and the period, unusually long.
88. The light curve of this star appears to have a double maximum, like that of 62. The measurement was difficult on many plates. The residuals from the smooth curve are so large as to indicate an error in the period or the need of a secular correction.
89. This is a somewhat difficult star, but the elements given in the table seem to be satisfactory.
90. This is a difficult star for measurement on many of the plates. The elements given in the table satisfy the observations fairly well.
91. The results for this star are not very satisfactory, and the elements given in the table are somewhat doubtful. The object is a difficult one, whose image is confused with that of an adjacent star on many plates.
92. This star is extremely close to a brighter star, so that it is only partially separated even on the best plates. On this account no measurements were made of the early plates from J. D. 1141 to J. D. 4052. Also the measurements from J. D. 4133 to J. D. 5581 are of the combined light of both stars, and will not serve well for the determination of the period. The observations from J. D. 4058, to J. D. 4093 are satisfied by a period of $0^d.45$, but owing to the small number of the observations available this period must be regarded as doubtful.

CHAPTER VIII

MISCELLANEOUS RESULTS.

The periods of 72 variable stars in Messier 5 were given in Table XXV. The light curves of these stars will be found in Table XXVI. The period of each variable has been divided into twenty four equal parts, and the magnitudes corresponding to these points of division have been read from the smooth curves drawn through all the observations. In most cases the results are only approximate, since the individual observations scatter somewhat widely, as is apparent from the residuals in the last column for each star in Table XXIII, so that a precise determination of the form of the curve is difficult. The first column on each page gives the numbers of the points of division. The results for each star occupy three columns, the first of which gives the phase, the second, the corresponding magnitude, and the third, the differences found by subtracting each magnitude from the one immediately following it. These differences represent, therefore, the increase or decrease in magnitude expressed in hundredths for each twenty-fourth part of the period of the star.

The quantities given in Table XXVI were derived from the same curves as the results found in the fifth to the thirteenth columns of the Table of Elements in Chapter VII. These curves were drawn by hand through the observations, and their precise form is doubtful, in many cases. In order to obtain mean light curves entirely free from the personal equation of the draftsman, 30 variables were selected and divided into three groups of 10 stars each, according to the length of the period. The elements of all these stars appear to be free from uncertainty. They were chosen by reference to the remarks, previously written, following the Table of Elements. The first group consists of the 10 variables having the shortest periods among the 30 selected stars, the second group, those of medium period, and the third group, those of the longest periods. In the first group, consisting of the variables 32, 12, 19, 38, 41, 58, 7, 63, 33, and 71, the periods range from $0^d.458$ to $0^d.502$, the mean being $0^d.484$. The periods of the stars of the second group, Nos. 1, 10, 56, 47, 59, 28, 64, 8, 81, and 61, are between $0^d.522$ and $0^d.569$, the mean being $0^d.543$. The periods in the third group, Nos. 39, 30, 11, 3, 21, 20, 16, 43, 9, and 87, range from $0^d.589$ to $0^d.738$, the mean being $0^d.634$. The period of each star was then divided into 48 equal parts and the corresponding phases of the obser-

TABLE XXVI

LIGHT CURVES

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 1			No. 2			No. 3			No. 4			No. 5		
	d.			d.			d.			d.			d.		
0	0.000	14.21	+.15	0.000	14.58	+.03	0.000	14.68	+.01	0.000	14.20	+.07	0.000	14.29	+.03
1	0.022	14.36	+.16	0.022	14.61	+.07	0.025	14.69	+.04	0.019	14.27	+.11	0.023	14.32	+.09
2	0.043	14.52	+.18	0.044	14.68	+.11	0.050	14.73	+.05	0.037	14.38	+.14	0.045	14.41	+.12
3	0.065	14.70	+.16	0.066	14.79	+.12	0.075	14.78	+.09	0.056	14.52	+.14	0.068	14.53	+.17
4	0.087	14.86	+.13	0.088	14.91	+.12	0.100	14.87	+.07	0.075	14.66	+.13	0.091	14.70	+.18
5	0.109	14.99	+.13	0.110	15.03	+.09	0.125	14.94	+.09	0.094	14.79	+.13	0.114	14.88	+.14
6	0.130	15.12	+.12	0.132	15.12	+.10	0.150	15.03	+.08	0.112	14.92	+.13	0.136	15.02	+.13
7	0.152	15.24	+.08	0.154	15.22	+.07	0.175	15.11	+.08	0.131	15.05	+.11	0.159	15.15	+.09
8	0.174	15.32	+.06	0.175	15.29	+.05	0.200	15.19	+.07	0.150	15.16	+.08	0.182	15.24	+.08
9	0.196	15.38	+.07	0.197	15.34	+.06	0.225	15.26	+.07	0.169	15.24	+.08	0.205	15.32	+.05
10	0.217	15.45	+.05	0.219	15.40	+.03	0.250	15.33	+.05	0.187	15.32	+.07	0.227	15.37	+.06
11	0.239	15.50	+.03	0.241	15.43	+.05	0.275	15.38	+.04	0.206	15.39	+.04	0.250	15.43	+.05
12	0.261	15.53	+.04	0.263	15.48	+.01	0.300	15.42	+.04	0.225	15.43	+.06	0.273	15.48	+.04
13	0.283	15.57	.00	0.285	15.49	+.01	0.325	15.46	+.03	0.244	15.49	+.01	0.296	15.52	+.02
14	0.304	15.57	.00	0.307	15.50	+.01	0.350	15.49	+.01	0.262	15.50	+.01	0.318	15.54	+.03
15	0.326	15.57	.00	0.329	15.51	−.02	0.375	15.50	+.02	0.281	15.51	+.01	0.341	15.57	+.02
16	0.348	15.57	.00	0.351	15.49	−.08	0.400	15.52	+.01	0.300	15.52	+.01	0.364	15.59	+.01
17	0.370	15.57	−.01	0.373	15.41	−.11	0.425	15.53	+.01	0.318	15.53	.00	0.387	15.60	−.01
18	0.391	15.56	−.03	0.395	15.30	−.18	0.450	15.54	.00	0.337	15.53	−.01	0.409	15.59	−.02
19	0.413	15.53	−.04	0.417	15.12	−.20	0.475	15.54	−.01	0.356	15.52	−.01	0.432	15.57	−.09
20	0.435	15.49	−.21	0.439	14.92	−.14	0.500	15.53	−.04	0.375	15.51	−.03	0.455	15.48	−.24
21	0.457	15.28	−.48	0.461	14.78	−.11	0.525	15.49	−.30	0.393	15.48	−.12	0.478	15.24	−.57
22	0.478	14.80	−.41	0.482	14.67	−.07	0.550	15.19	−.33	0.412	15.36	−.48	0.500	14.67	−.31
23	0.500	14.39	−.18	0.504	14.60	−.02	0.575	14.86	−.18	0.431	14.88	−.68	0.523	14.36	−.07
	No. 6			No. 7			No. 8			No. 9			No. 10		
	d.			d.			d.			d.			d.		
0	0.000	14.20	+.12	0.000	14.26	+.08	0.000	14.26	+.17	0.000	14.40	+.04	0.000	14.17	+.11
1	0.023	14.32	+.14	0.021	14.34	+.15	0.023	14.43	+.18	0.029	14.44	+.08	0.022	14.28	+.13
2	0.046	14.46	+.12	0.041	14.49	+.12	0.046	14.61	+.13	0.058	14.52	+.07	0.044	14.41	+.12
3	0.069	14.58	+.08	0.062	14.61	+.15	0.068	14.74	+.15	0.087	14.59	+.09	0.066	14.53	+.13
4	0.091	14.66	+.07	0.082	14.76	+.16	0.091	14.89	+.13	0.117	14.68	+.08	0.088	14.66	+.15
5	0.114	14.73	+.06	0.103	14.92	+.14	0.114	15.02	+.08	0.146	14.76	+.11	0.111	14.81	+.11
6	0.137	14.79	+.07	0.124	15.06	+.13	0.137	15.10	+.08	0.175	14.87	+.09	0.133	14.92	+.08
7	0.160	14.86	+.07	0.144	15.19	+.13	0.159	15.18	+.09	0.204	14.96	+.08	0.155	15.00	+.09
8	0.183	14.93	+.04	0.165	15.32	+.10	0.182	15.27	+.07	0.233	15.04	+.09	0.177	15.09	+.07
9	0.206	14.97	+.03	0.185	15.42	+.10	0.205	15.34	+.06	0.262	15.13	+.08	0.199	15.16	+.06

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 6			No. 7			No. 8			No. 9			No. 10		
	d.			d.			d.			d.			d.		
10	0.229	15.00	+.05	0.206	15.52	+.09	0.228	15.40	+.06	0.291	15.21	+.07	0.221	15.22	+.05
11	0.252	15.05	+.04	0.227	15.61	+.07	0.250	15.46	+.05	0.320	15.28	+.06	0.243	15.27	+.05
12	0.274	15.09	+.03	0.247	15.68	+.05	0.273	15.51	+.03	0.350	15.34	+.05	0.265	15.32	+.04
13	0.297	15.12	+.02	0.268	15.73	+.03	0.296	15.54	+.05	0.379	15.39	+.03	0.287	15.36	+.04
14	0.320	15.14	+.03	0.288	15.76	+.01	0.319	15.59	+.01	0.408	15.42	+.02	0.310	15.40	+.03
15	0.343	15.17	+.01	0.309	15.77	+.01	0.341	15.60	+.01	0.437	15.44	+.03	0.332	15.43	+.01
16	0.366	15.18	+.01	0.330	15.78	+.02	0.364	15.61	.00	0.466	15.47	+.01	0.354	15.44	+.02
17	0.389	15.19	+.01	0.350	15.80	−.01	0.387	15.61	.00	0.495	15.48	+.02	0.376	15.46	.00
18	0.412	15.20	−.01	0.371	15.79	−.03	0.410	15.61	−.01	0.524	15.50	.00	0.398	15.46	+.01
19	0.435	15.19	−.02	0.391	15.76	−.04	0.432	15.60	−.02	0.553	15.50	−.02	0.420	15.47	.00
20	0.457	15.17	−.04	0.412	15.72	−.09	0.455	15.58	−.06	0.583	15.48	−.22	0.442	15.47	−.04
21	0.480	15.13	−.48	0.433	15.63	−.73	0.478	15.52	−.33	0.612	15.26	−.55	0.464	15.43	−.31
22	0.503	14.65	−.39	0.453	14.90	−.51	0.501	15.19	−.51	0.641	14.71	−.23	0.486	15.12	−.85
23	0.526	14.26	−.06	0.474	14.39	−.13	0.523	14.68	−.42	0.670	14.48	−.08	0.509	14.27	−.10
	No. 11			No. 12			No. 13			No. 14			No. 15		
	d.			d.			d.			d.			d.		
0	0.000	14.13	+.07	0.000	14.20	+.12	0.000	14.20	+.05	0.000	14.50	+.02	0.000	14.79	+.01
1	0.025	14.20	+.10	0.019	14.32	+.19	0.021	14.25	+.13	0.020	14.52	+.06	0.021	14.80	+.02
2	0.050	14.30	+.12	0.039	14.51	+.15	0.043	14.38	+.11	0.041	14.58	+.06	0.042	14.82	+.02
3	0.074	14.42	+.13	0.058	14.66	+.14	0.064	14.49	+.13	0.061	14.64	+.10	0.063	14.84	+.05
4	0.099	14.55	+.12	0.078	14.80	+.15	0.086	14.62	+.12	0.081	14.74	+.15	0.085	14.89	+.04
5	0.124	14.67	+.11	0.097	14.95	+.11	0.107	14.74	+.10	0.102	14.89	+.09	0.106	14.93	+.04
6	0.149	14.78	+.11	0.117	15.06	+.11	0.128	14.84	+.10	0.122	14.98	+.09	0.127	14.97	+.05
7	0.174	14.89	+.10	0.136	15.17	+.12	0.150	14.94	+.07	0.142	15.07	+.08	0.148	15.02	+.06
8	0.199	14.99	+.08	0.156	15.29	+.09	0.171	15.01	+.07	0.162	15.15	+.07	0.169	15.08	+.05
9	0.223	15.07	+.07	0.175	15.38	+.11	0.192	15.08	+.05	0.183	15.22	+.08	0.190	15.13	+.06
10	0.248	15.14	+.09	0.195	15.49	+.08	0.214	15.13	+.04	0.203	15.30	+.04	0.212	15.19	+.03
11	0.273	15.23	+.05	0.214	15.57	+.05	0.235	15.17	+.03	0.223	15.34	+.05	0.233	15.22	+.03
12	0.298	15.28	+.04	0.234	15.62	+.05	0.257	15.20	+.02	0.244	15.39	.00	0.254	15.25	+.03
13	0.323	15.32	+.03	0.253	15.67	+.03	0.278	15.22	+.02	0.264	15.39	+.01	0.275	15.28	+.02
14	0.348	15.35	+.04	0.273	15.70	+.02	0.299	15.24	+.02	0.284	15.40	+.01	0.296	15.30	.00
15	0.372	15.39	+.01	0.292	15.72	+.01	0.321	15.26	.00	0.305	15.41	.00	0.317	15.30	.00
16	0.397	15.40	+.01	0.312	15.73	+.01	0.342	15.26	−.01	0.325	15.41	−.01	0.338	15.30	−.01
17	0.422	15.41	+.01	0.331	15.74	+.01	0.363	15.25	−.02	0.345	15.40	−.02	0.360	15.29	−.03
18	0.447	15.42	.00	0.351	15.75	+.01	0.385	15.23	−.04	0.365	15.38	−.11	0.381	15.26	−.06
19	0.472	15.42	−.01	0.370	15.76	−.03	0.406	15.19	−.06	0.386	15.27	−.13	0.402	15.20	−.07
20	0.497	15.41	−.01	0.390	15.73	−.30	0.428	15.13	−.15	0.406	15.14	−.20	0.423	15.13	−.10
21	0.521	15.40	−.18	0.409	15.43	−.63	0.449	14.98	−.29	0.426	14.94	−.26	0.444	15.03	−.11
22	0.546	15.22	−.67	0.429	14.80	−.55	0.470	14.69	−.32	0.447	14.68	−.15	0.465	14.92	−.07
23	0.571	14.55	−.42	0.448	14.25	−.05	0.492	14.37	−.17	0.467	14.53	−.03	0.487	14.85	−.06

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 16			No. 18			No. 19			No. 20			No. 21		
	d.			d.			d.			d.			d.		
0	0.000	14.20	+.07	0.000	14.60	+.02	0.000	14.30	+.03	0.000	14.30	+.07	0.000	14.54	+.02
1	0.027	14.27	+.04	0.019	14.62	+.06	0.020	14.33	+.08	0.025	14.37	+.07	0.025	14.56	+.05
2	0.054	14.31	+.09	0.039	14.68	+.05	0.039	14.41	+.18	0.051	14.44	+.08	0.050	14.61	+.08
3	0.081	14.40	+.15	0.058	14.73	+.11	0.059	14.59	+.21	0.076	14.52	+.11	0.076	14.69	+.12
4	0.108	14.55	+.14	0.077	14.84	+.14	0.078	14.80	+.16	0.102	14.63	+.09	0.101	14.81	+.11
5	0.135	14.69	+.16	0.097	14.98	+.11	0.098	14.96	+.12	0.127	14.72	+.10	0.126	14.92	+.09
6	0.162	14.85	+.10	0.116	15.09	+.10	0.117	15.08	+.12	0.152	14.82	+.06	0.151	15.01	+.08
7	0.189	14.95	+.11	0.135	15.19	+.05	0.137	15.20	+.11	0.178	14.88	+.08	0.176	15.09	+.09
8	0.216	15.06	+.10	0.155	15.24	+.07	0.157	15.31	+.11	0.203	14.96	+.06	0.202	15.18	+.06
9	0.243	15.16	+.06	0.174	15.31	+.04	0.176	15.42	+.08	0.229	15.02	+.06	0.227	15.24	+.05
10	0.270	15.22	+.06	0.193	15.35	+.06	0.196	15.50	+.07	0.254	15.08	+.06	0.252	15.29	+.05
11	0.297	15.28	+.05	0.213	15.41	+.02	0.215	15.57	+.05	0.279	15.14	+.05	0.277	15.34	+.04
12	0.324	15.33	+.05	0.232	15.43	+.01	0.235	15.62	+.05	0.305	15.19	+.03	0.302	15.38	+.02
13	0.351	15.38	+.03	0.251	15.44	+.02	0.255	15.67	+.03	0.330	15.22	+.04	0.328	15.40	+.03
14	0.378	15.41	+.02	0.271	15.46	+.01	0.274	15.70	+.02	0.356	15.26	+.02	0.353	15.43	+.01
15	0.405	15.43	+.03	0.290	15.47	.00	0.294	15.72	+.02	0.381	15.28	+.01	0.378	15.44	+.02
16	0.432	15.46	+.02	0.309	15.47	+.01	0.313	15.74	+.01	0.406	15.29	+.01	0.403	15.46	+.01
17	0.459	15.48	+.02	0.329	15.48	−.01	0.333	15.75	−.01	0.432	15.30	.00	0.428	15.47	+.01
18	0.486	15.50	.00	0.348	15.47	.00	0.352	15.74	−.03	0.457	15.30	.00	0.454	15.48	.00
19	0.513	15.50	−.01	0.367	15.47	−.03	0.372	15.71	−.09	0.483	15.30	+.01	0.479	15.48	.00
20	0.540	15.49	−.09	0.387	15.44	−.06	0.392	15.62	−.14	0.508	15.31	−.10	0.504	15.48	−.04
21	0.567	15.40	−.60	0.406	15.38	−.10	0.411	15.48	−.74	0.533	15.21	−.37	0.529	15.44	−.44
22	0.594	14.80	−.51	0.425	15.28	−.40	0.431	14.74	−.33	0.559	14.84	−.35	0.554	15.00	−.42
23	0.621	14.29	−.09	0.445	14.88	−.28	0.450	14.41	−.11	0.584	14.49	−.19	0.580	14.58	−.04
	No. 24			No. 26			No. 27			No. 28			No. 29		
	d.			d.			d.			d.			d.		
0	0.000	14.40	+.08	0.000	14.34	+.07	0.000	14.48	+.01	0.000	14.45	+.06	0.000	14.50	+.04
1	0.020	14.48	+.09	0.026	14.41	+.12	0.020	14.49	+.03	0.023	14.51	+.08	0.019	14.54	+.06
2	0.040	14.57	+.12	0.052	14.53	+.10	0.039	14.52	+.04	0.045	14.59	+.10	0.038	14.60	+.11
3	0.060	14.69	+.15	0.078	14.63	+.10	0.059	14.56	+.06	0.068	14.69	+.13	0.056	14.71	+.11
4	0.080	14.84	+.16	0.104	14.73	+.11	0.078	14.62	+.07	0.091	14.82	+.10	0.075	14.82	+.12
5	0.100	15.00	+.12	0.130	14.84	+.08	0.098	14.69	+.10	0.113	14.92	+.10	0.094	14.94	+.09
6	0.120	15.12	+.09	0.156	14.92	+.08	0.118	14.79	+.12	0.136	15.02	+.13	0.113	15.03	+.09
7	0.140	15.21	+.09	0.182	15.00	+.07	0.137	14.91	+.12	0.159	15.15	+.09	0.132	15.12	+.07
8	0.159	15.30	+.06	0.208	15.07	+.07	0.157	15.03	+.11	0.181	15.24	+.10	0.150	15.19	+.05
9	0.179	15.36	+.04	0.233	15.14	+.05	0.176	15.14	+.14	0.204	15.34	+.07	0.169	15.24	+.06
10	0.199	15.40	+.04	0.259	15.19	+.05	0.196	15.28	+.10	0.227	15.41	+.07	0.188	15.30	+.06
11	0.219	15.44	+.03	0.285	15.24	+.05	0.216	15.38	+.07	0.249	15.48	+.06	0.207	15.36	+.03

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 24			No. 26			No. 27			No. 28			No. 29		
	d.			d.			d.			d.			d.		
12	0.239	15.47	+.01	0.311	15.29	+.03	0.235	15.45	+.07	0.272	15.54	+.06	0.226	15.39	+.04
13	0.259	15.48	+.01	0.337	15.32	+.02	0.255	15.52	+.02	0.295	15.60	+.04	0.245	15.43	+.03
14	0.279	15.49	+.01	0.363	15.34	+.02	0.274	15.54	+.02	0.317	15.64	+.04	0.263	15.46	+.02
15	0.299	15.50	.00	0.389	15.36	+.01	0.294	15.56	+.02	0.340	15.68	+.02	0.282	15.48	+.01
16	0.319	15.50	.00	0.415	15.37	+.01	0.314	15.58	.00	0.363	15.70	+.01	0.301	15.49	.00
17	0.339	15.50	.00	0.441	15.38	+.01	0.333	15.58	.00	0.385	15.71	.00	0.320	15.49	−.01
18	0.359	15.50	−.02	0.467	15.39	+.01	0.353	15.58	−.02	0.408	15.71	+.01	0.339	15.48	−.02
19	0.379	15.48	−.03	0.493	15.40	.00	0.372	15.56	−.05	0.431	15.72	−.01	0.357	15.46	−.05
20	0.399	15.45	−.07	0.519	15.40	−.04	0.392	15.51	−.11	0.453	15.71	−.03	0.376	15.41	−.11
21	0.419	15.38	−.30	0.545	15.36	−.18	0.412	15.40	−.19	0.476	15.68	−.38	0.395	15.30	−.18
22	0.439	15.08	−.42	0.571	15.18	−.75	0.431	15.21	−.40	0.499	15.30	−.68	0.414	15.12	−.60
23	0.458	14.66	−.26	0.597	14.43	−.09	0.451	14.81	−.33	0.521	14.62	−.17	0.433	14.52	−.02
	No. 30			No. 31			No. 32			No. 33			No. 34		
	d.			d.			d.			d.			d.		
0	0.000	14.60	+.03	0.000	14.66	+.02	0.000	14.16	+.13	0.000	14.34	+.09	0.000	14.42	+.08
1	0.025	14.63	+.05	0.019	14.68	+.04	0.019	14.29	+.19	0.021	14.43	+.17	0.024	14.50	+.11
2	0.049	14.68	+.06	0.038	14.72	+.09	0.038	14.48	+.19	0.042	14.60	+.15	0.047	14.61	+.12
3	0.074	14.74	+.08	0.058	14.81	+.11	0.057	14.67	+.15	0.063	14.75	+.16	0.071	14.73	+.09
4	0.099	14.82	+.08	0.077	14.92	+.20	0.076	14.82	+.14	0.084	14.91	+.12	0.095	14.82	+.09
5	0.123	14.90	+.07	0.096	15.12	+.16	0.095	14.96	+.14	0.104	15.03	+.12	0.118	14.91	+.07
6	0.148	14.97	+.07	0.115	15.28	+.04	0.114	15.10	+.10	0.125	15.15	+.12	0.142	14.98	+.06
7	0.173	15.04	+.07	0.135	15.32	.00	0.134	15.20	+.10	0.146	15.27	+.09	0.166	15.04	+.06
8	0.197	15.11	+.08	0.154	15.32	−.04	0.153	15.30	+.08	0.167	15.36	+.08	0.189	15.10	+.09
9	0.222	15.19	+.05	0.173	15.28	−.14	0.172	15.38	+.04	0.188	15.44	+.07	0.213	15.19	+.06
10	0.247	15.24	+.04	0.192	15.14	−.21	0.191	15.42	+.07	0.209	15.51	+.07	0.237	15.25	+.07
11	0.271	15.28	+.04	0.212	14.93	−.14	0.210	15.49	+.03	0.230	15.58	+.05	0.260	15.32	+.06
12	0.296	15.32	+.05	0.231	14.79	−.07	0.229	15.52	+.03	0.251	15.63	+.05	0.284	15.38	+.02
13	0.321	15.37	+.03	0.250	14.72	.00	0.248	15.55	+.03	0.272	15.68	+.02	0.308	15.40	+.03
14	0.345	15.40	+.03	0.269	14.72	+.05	0.267	15.58	+.01	0.293	15.70	+.01	0.331	15.43	+.03
15	0.370	15.43	+.03	0.289	14.77	+.25	0.286	15.59	+.01	0.313	15.71	+.01	0.355	15.46	+.01
16	0.395	15.46	+.02	0.308	15.02	+.21	0.305	15.60	.00	0.334	15.72	+.01	0.379	15.47	+.01
17	0.419	15.48	+.01	0.327	15.23	+.11	0.324	15.60	.00	0.355	15.73	+.01	0.402	15.48	.00
18	0.444	15.49	+.01	0.346	15.34	+.04	0.343	15.60	−.01	0.376	15.74	+.01	0.426	15.48	−.04
19	0.469	15.50	.00	0.366	15.38	−.01	0.362	15.59	−.05	0.397	15.75	.00	0.450	15.44	−.10
20	0.493	15.50	.00	0.385	15.37	−.14	0.381	15.54	−.13	0.418	15.75	−.02	0.473	15.34	−.25
21	0.518	15.50	−.16	0.404	15.23	−.22	0.401	15.41	−.41	0.439	15.73	−.41	0.497	15.09	−.50
22	0.543	15.34	−.45	0.423	15.01	−.23	0.420	15.00	−.71	0.460	15.32	−.58	0.521	14.59	−.18
23	0.568	14.89	−.29	0.443	14.78	−.12	0.439	14.29	−.13	0.481	14.74	−.40	0.544	14.41	+.01

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 35			No. 37			No. 38			No. 39			No. 41		
	d.			d.			d.			d.			d.		
0	0.000	14.62	+.02	0.000	14.10	+.14	0.000	14.34	+.06	0.000	14.13	+.11	0.000	14.10	+.07
1	0.026	14.64	+.09	0.020	14.24	+.15	0.020	14.40	+.09	0.025	14.24	+.13	0.020	14.17	+.13
2	0.051	14.73	+.17	0.041	14.39	+.18	0.039	14.49	+.15	0.049	14.37	+.14	0.041	14.30	+.18
3	0.077	14.90	+.19	0.061	14.57	+.16	0.059	14.64	+.13	0.074	14.51	+.13	0.061	14.48	+.21
4	0.103	15.09	+.10	0.081	14.73	+.21	0.078	14.77	+.09	0.098	14.64	+.14	0.081	14.69	+.21
5	0.128	15.19	+.04	0.102	14.94	+.18	0.098	14.86	+.11	0.123	14.78	+.11	0.102	14.90	+.13
6	0.154	15.23	−.03	0.122	15.12	+.14	0.118	14.97	+.10	0.147	14.89	+.12	0.122	15.03	+.14
7	0.180	15.20	−.14	0.143	15.26	+.12	0.137	15.07	+.07	0.172	15.01	+.09	0.142	15.17	+.12
8	0.206	15.06	−.21	0.163	15.38	+.10	0.157	15.14	+.09	0.196	15.10	+.10	0.163	15.29	+.10
9	0.231	14.85	−.12	0.183	15.48	+.05	0.176	15.23	+.06	0.221	15.20	+.09	0.183	15.39	+.07
10	0.257	14.73	−.05	0.204	15.53	+.07	0.196	15.29	+.05	0.245	15.29	+.06	0.204	15.46	+.05
11	0.283	14.68	−.01	0.224	15.60	+.04	0.216	15.34	+.06	0.270	15.35	+.06	0.224	15.51	+.06
12	0.308	14.67	+.02	0.244	15.64	+.04	0.235	15.40	+.04	0.295	15.41	+.06	0.244	15.57	+.05
13	0.334	14.69	+.08	0.265	15.68	+.02	0.255	15.44	+.04	0.319	15.47	+.03	0.265	15.62	+.02
14	0.360	14.77	+.14	0.285	15.70	+.03	0.274	15.48	+.01	0.344	15.50	+.03	0.285	15.64	+.02
15	0.385	14.91	+.17	0.305	15.73	+.01	0.294	15.49	+.01	0.368	15.53	+.03	0.305	15.66	+.01
16	0.411	15.08	+.10	0.326	15.74	+.02	0.314	15.50	+.01	0.393	15.56	+.01	0.326	15.67	.00
17	0.437	15.18	+.03	0.346	15.76	.00	0.333	15.51	.00	0.417	15.57	.00	0.346	15.67	+.01
18	0.463	15.21	−.02	0.367	15.76	.00	0.353	15.51	.00	0.442	15.57	−.01	0.366	15.68	−.01
19	0.488	15.19	−.10	0.387	15.76	−.01	0.372	15.51	−.01	0.466	15.56	−.04	0.387	15.67	−.03
20	0.514	15.09	−.17	0.407	15.75	−.05	0.392	15.50	−.06	0.491	15.52	−.24	0.407	15.64	−.15
21	0.540	14.92	−.20	0.428	15.70	−.48	0.412	15.44	−.22	0.515	15.28	−.59	0.427	15.49	−.59
22	0.565	14.72	−.06	0.448	15.22	−.89	0.431	15.22	−.52	0.540	14.69	−.50	0.448	14.90	−.63
23	0.591	14.66	−.04	0.468	14.33	−.23	0.451	14.70	−.36	0.564	14.19	−.06	0.468	14.27	−.17
	No. 42			No. 43			No. 44			No. 45			No. 47		
	d.			d.			d.			d.			d.		
0	0.00	11.20	+.02	0.000	14.68	+.02	0.000	14.67	+.01	0.000	14.37	+.01	0.000	14.28	+.02
1	1.07	11.22	+.03	0.028	14.70	+.06	0.021	14.68	+.04	0.026	14.38	+.05	0.022	14.30	+.10
2	2.15	11.25	+.05	0.055	14.76	+.07	0.041	14.72	+.07	0.051	14.43	+.08	0.045	14.40	+.12
3	3.22	11.30	+.06	0.083	14.83	+.08	0.062	14.79	+.13	0.077	14.51	+.10	0.067	14.52	+.16
4	4.29	11.36	+.06	0.110	14.91	+.07	0.083	14.92	+.14	0.103	14.61	+.08	0.090	14.68	+.13
5	5.36	11.42	+.07	0.138	14.98	+.06	0.103	15.06	+.07	0.128	14.69	+.10	0.112	14.81	+.11
6	6.44	11.49	+.09	0.165	15.04	+.05	0.124	15.13	+.04	0.154	14.79	+.09	0.135	14.92	+.10
7	7.51	11.58	+.09	0.193	15.09	+.06	0.145	15.17	.00	0.180	14.88	+.06	0.157	15.02	+.11
8	8.58	11.67	+.11	0.220	15.15	+.04	0.165	15.17	−.09	0.206	14.94	+.07	0.180	15.13	+.10
9	9.66	11.78	+.11	0.248	15.19	+.05	0.186	15.08	−.11	0.231	15.01	+.06	0.202	15.23	+.09
10	10.73	11.89	+.10	0.275	15.24	+.04	0.207	14.97	−.15	0.257	15.07	+.06	0.225	15.32	+.07
11	11.80	11.99	+.08	0.303	15.28	+.04	0.227	14.82	−.12	0.283	15.13	+.05	0.247	15.39	+.09

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 42			No. 43			No. 44			No. 45			No. 47		
	d.			d.			d.			d.			d.		
12	12.88	12.07	+.06	0.330	15.32	+.02	0.248	14.70	−.04	0.308	15.18	+.04	0.270	15.48	+.06
13	13.95	12.13	+.04	0.358	15.34	+.03	0.269	14.66	+.03	0.334	15.22	+.06	0.292	15.54	+.05
14	15.02	12.17	+.02	0.385	15.37	+.02	0.289	14.69	+.09	0.360	15.28	+.03	0.315	15.59	+.05
15	16.10	12.19	+.02	0.413	15.39	+.02	0.310	14.78	+.15	0.385	15.31	+.03	0.337	15.64	+.05
16	17.17	12.21	+.02	0.440	15.41	+.02	0.331	14.93	+.15	0.411	15.34	+.03	0.360	15.69	+.03
17	18.24	12.23	+.01	0.468	15.43	.00	0.351	15.08	+.08	0.437	15.37	+.01	0.382	15.72	+.02
18	19.31	12.24	−.01	0.495	15.43	−.11	0.372	15.16	+.06	0.462	15.38	+.01	0.405	15.74	+.02
19	20.39	12.23	−.06	0.523	15.32	−.27	0.393	15.22	+.01	0.488	15.39	+.01	0.427	15.76	+.02
20	21.46	12.17	−.14	0.550	15.05	−.19	0.413	15.23	−.04	0.514	15.40	−.03	0.450	15.78	−.02
21	22.53	12.03	−.58	0.578	14.86	−.13	0.434	15.19	−.11	0.540	15.37	−.23	0.472	15.76	−.20
22	23.61	11.45	−.22	0.605	14.73	−.04	0.454	15.08	−.25	0.565	15.14	−.41	0.495	15.56	−.54
23	24.68	11.23	−.03	0.633	14.69	−.01	0.475	14.83	−.16	0.591	14.73	−.36	0.517	15.02	−.74
	No. 50			No. 52			No. 55			No. 56			No. 58		
	d.			d.			d.			d.			d.		
0	0.0	13.00	+.04	0.000	14.25	+.05	0.000	14.75	+.03	0.000	14.34	+.13	0.000	14.10	+.09
1	4.4	13.04	+.07	0.021	14.30	+.10	0.020	14.78	+.05	0.022	14.47	+.16	0.020	14.19	+.15
2	8.8	13.11	+.07	0.042	14.40	+.13	0.041	14.83	+.07	0.045	14.63	+.16	0.041	14.34	+.20
3	13.3	13.18	+.11	0.063	14.53	+.13	0.061	14.90	+.05	0.067	14.79	+.10	0.061	14.54	+.20
4	17.7	13.29	+.11	0.084	14.66	+.12	0.082	14.95	+.06	0.089	14.89	+.12	0.082	14.74	+.16
5	22.1	13.40	+.11	0.105	14.78	+.11	0.102	15.01	+.06	0.111	15.01	+.08	0.102	14.90	+.14
6	26.5	13.51	+.11	0.125	14.89	+.09	0.123	15.07	+.04	0.134	15.09	+.08	0.123	15.04	+.10
7	30.9	13.62	+.12	0.146	14.98	+.10	0.143	15.11	+.03	0.156	15.17	+.06	0.143	15.14	+.09
8	35.3	13.74	+.11	0.167	15.08	+.08	0.164	15.14	+.04	0.178	15.23	+.09	0.164	15.23	+.06
9	39.8	13.85	+.10	0.188	15.16	+.06	0.184	15.18	+.01	0.201	15.32	+.06	0.184	15.29	+.05
10	44.2	13.95	+.09	0.209	15.22	+.06	0.204	15.19	+.02	0.223	15.38	+.06	0.205	15.34	+.05
11	48.6	14.04	+.05	0.230	15.28	+.04	0.225	15.21	+.01	0.245	15.44	+.06	0.225	15.39	+.03
12	53.0	14.09	+.04	0.251	15.32	+.04	0.245	15.22	+.01	0.267	15.50	+.04	0.246	15.42	+.04
13	57.4	14.13	+.03	0.272	15.36	+.02	0.266	15.23	+.01	0.290	15.54	+.02	0.266	15.46	+.03
14	61.8	14.16	+.02	0.293	15.38	+.01	0.286	15.24	+.01	0.312	15.56	+.02	0.287	15.49	+.03
15	66.3	14.18	+.01	0.314	15.39	.00	0.307	15.25	−.01	0.334	15.58	+.01	0.307	15.52	+.02
16	70.7	14.19	+.01	0.335	15.39	+.01	0.327	15.24	−.01	0.356	15.59	+.01	0.328	15.54	+.02
17	75.1	14.20	−.01	0.355	15.40	.00	0.348	15.23	−.01	0.379	15.60	.00	0.348	15.56	.00
18	79.5	14.19	−.03	0.376	15.40	.00	0.368	15.22	−.01	0.401	15.60	−.01	0.369	15.56	−.02
19	83.9	14.16	−.08	0.397	15.40	.00	0.388	15.21	−.02	0.423	15.59	−.10	0.389	15.54	−.08
20	88.3	14.08	−.35	0.418	15.40	−.04	0.409	15.19	−.05	0.446	15.49	−.21	0.410	15.46	−.24
21	92.8	13.73	−.51	0.439	15.36	−.64	0.429	15.14	−.12	0.468	15.28	−.37	0.430	15.22	−.38
22	97.2	13.22	−.18	0.460	14.72	−.43	0.450	15.02	−.20	0.490	14.91	−.41	0.451	14.84	−.45
23	101.6	13.04	−.04	0.481	14.29	−.04	0.470	14.82	−.07	0.512	14.50	−.16	0.471	14.39	−.29

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 59			No. 61			No. 62			No. 63			No. 64		
	d.			d.			d.			d.			d.		
0	0.000	14.26	+.07	0.000	14.46	+.06	0.000	14.70	+.01	0.000	14.23	+.09	0.000	14.40	+.06
1	0.023	14.33	+.16	0.024	14.52	+.10	0.023	14.71	+.02	0.021	14.32	+.11	0.023	14.46	+.11
2	0.045	14.49	+.15	0.047	14.62	+.14	0.047	14.73	+.04	0.041	14.43	+.15	0.045	14.57	+.13
3	0.068	14.64	+.13	0.071	14.76	+.10	0.070	14.77	+.06	0.062	14.58	+.16	0.068	14.70	+.15
4	0.090	14.77	+.12	0.095	14.86	+.10	0.094	14.83	+.10	0.083	14.74	+.15	0.091	14.85	+.14
5	0.113	14.89	+.11	0.118	14.96	+.11	0.117	14.93	+.12	0.104	14.89	+.14	0.113	14.99	+.12
6	0.136	15.00	+.08	0.142	15.07	+.09	0.141	15.05	+.12	0.124	15.03	+.13	0.136	15.11	+.13
7	0.158	15.08	+.09	0.166	15.16	+.10	0.164	15.17	+.11	0.145	15.16	+.11	0.159	15.24	+.12
8	0.181	15.17	+.06	0.190	15.26	+.09	0.188	15.28	+.06	0.166	15.27	+.10	0.182	15.36	+.07
9	0.203	15.23	+.06	0.213	15.35	+.07	0.211	15.34	.00	0.187	15.37	+.06	0.204	15.43	+.06
10	0.226	15.29	+.04	0.237	15.42	+.04	0.235	15.34	−.12	0.207	15.43	+.04	0.227	15.49	+.06
11	0.248	15.33	+.05	0.261	15.46	+.02	0.258	15.22	−.32	0.228	15.47	+.04	0.250	15.55	+.04
12	0.271	15.38	+.01	0.284	15.48	+.03	0.281	14.90	−.13	0.249	15.51	+.01	0.272	15.59	+.02
13	0.294	15.39	+.01	0.308	15.51	+.01	0.305	14.77	−.05	0.270	15.52	+.02	0.295	15.61	+.03
14	0.316	15.40	+.01	0.332	15.52	.00	0.328	14.72	+.05	0.290	15.54	+.01	0.318	15.64	+.03
15	0.339	15.41	+.01	0.355	15.52	.00	0.352	14.77	+.10	0.311	15.55	+.02	0.340	15.67	+.02
16	0.361	15.42	+.01	0.379	15.52	.00	0.375	14.87	+.14	0.332	15.57	.00	0.363	15.69	+.01
17	0.384	15.43	+.01	0.403	15.52	.00	0.399	15.01	+.21	0.353	15.57	.00	0.386	15.70	.00
18	0.407	15.44	.00	0.426	15.52	.00	0.422	15.22	+.08	0.373	15.57	−.01	0.408	15.70	.00
19	0.429	15.44	−.01	0.450	15.52	−.02	0.446	15.30	+.02	0.394	15.56	−.06	0.431	15.70	.00
20	0.452	15.43	−.02	0.474	15.50	−.21	0.469	15.32	−.06	0.415	15.50	−.27	0.454	15.70	−.03
21	0.474	15.41	−.21	0.498	15.29	−.43	0.492	15.26	−.14	0.435	15.23	−.35	0.476	15.67	−.55
22	0.497	15.20	−.50	0.521	14.86	−.27	0.516	15.12	−.24	0.456	14.88	−.34	0.499	15.12	−.61
23	0.519	14.70	−.44	0.545	14.59	−.13	0.539	14.88	−.18	0.477	14.54	−.31	0.522	14.51	−.11
	No. 65			No. 66			No. 68			No. 69			No. 70		
	d.			d.			d.			d.			d.		
0	0.000	14.36	+.01	0.000	14.71	−.01	0.000	14.75	+.02	0.000	14.17	+.01	0.000	14.40	+.12
1	0.020	14.37	+.03	0.029	14.70	+.02	0.021	14.77	+.02	0.021	14.18	+.06	0.023	14.52	+.12
2	0.040	14.40	+.03	0.059	14.72	+.06	0.042	14.79	+.03	0.041	14.24	+.13	0.047	14.64	+.16
3	0.060	14.43	+.04	0.088	14.78	+.08	0.063	14.82	+.03	0.062	14.37	+.13	0.070	14.80	+.13
4	0.080	14.47	+.08	0.117	14.86	+.09	0.084	14.85	+.04	0.082	14.50	+.15	0.093	14.93	+.13
5	0.100	14.55	+.10	0.146	14.95	+.09	0.105	14.89	+.03	0.103	14.65	+.13	0.116	15.06	+.10
6	0.120	14.65	+.10	0.176	15.04	+.09	0.126	14.92	+.05	0.124	14.78	+.11	0.140	15.16	+.08
7	0.140	14.76	+.11	0.205	15.13	+.05	0.146	14.97	+.03	0.144	14.89	+.12	0.163	15.24	+.06
8	0.160	14.87	+.11	0.234	15.18	−.06	0.167	15.00	+.03	0.165	15.01	+.11	0.186	15.30	+.05
9	0.180	14.97	+.10	0.263	15.12	−.21	0.188	15.03	+.05	0.186	15.12	+.10	0.209	15.35	+.05
10	0.200	15.06	+.09	0.293	14.91	−.15	0.209	15.08	+.03	0.206	15.22	+.09	0.233	15.40	+.03
11	0.220	15.15	+.09	0.322	14.76	−.06	0.230	15.11	+.02	0.227	15.31	+.05	0.256	15.43	+.03

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 65			No. 66			No. 68			No. 69			No. 70		
	d.			d.			d.			d.			d.		
12	0.240	15.24	+.09	0.351	14.70	−.01	0.251	15.13	+.04	0.247	15.36	+.03	0.279	15.46	+.02
13	0.260	15.32	+.08	0.380	14.69	+.03	0.272	15.17	+.03	0.268	15.39	+.03	0.303	15.48	.00
14	0.280	15.38	+.06	0.410	14.72	+.06	0.293	15.20	+.02	0.289	15.42	+.01	0.326	15.48	+.01
15	0.300	15.43	+.05	0.439	14.78	+.08	0.314	15.22	+.01	0.309	15.43	.00	0.349	15.49	.00
16	0.320	15.47	+.04	0.468	14.86	+.10	0.335	15.23	−.01	0.330	15.43	+.01	0.372	15.49	+.01
17	0.340	15.49	+.02	0.497	14.96	+.11	0.356	15.22	−.03	0.351	15.44	−.01	0.396	15.50	.00
18	0.361	15.50	+.01	0.527	15.07	+.04	0.377	15.19	−.07	0.371	15.43	.00	0.419	15.50	−.02
19	0.381	15.52	.00	0.556	15.11	.00	0.398	15.12	−.11	0.392	15.43	−.01	0.442	15.48	−.07
20	0.401	15.52	−.03	0.585	15.11	−.04	0.418	15.01	−.09	0.412	15.42	−.08	0.465	15.41	−.33
21	0.421	15.49	−.22	0.614	15.07	−.12	0.439	14.92	−.09	0.433	15.34	−.38	0.489	15.08	−.40
22	0.441	15.27	−.70	0.644	14.95	−.17	0.460	14.83	−.05	0.454	14.96	−.52	0.512	14.68	−.22
23	0.461	14.57	−.21	0.673	14.78	−.07	0.481	14.78	−.03	0.474	14.44	−.27	0.535	14.46	−.06
	No. 71			No. 72			No. 75			No. 77			No. 79		
	d.			d.			d.			d.			d.		
0	0.000	14.26	+.05	0.000	14.59	+.01	0.000	14.70	+.03	0.000	14.56	+.02	0.000	14.60	.00
1	0.021	14.31	+.15	0.023	14.60	+.04	0.029	14.73	+.05	0.035	14.58	+.04	0.021	14.60	+.03
2	0.042	14.46	+.18	0.047	14.64	+.07	0.057	14.78	+.04	0.071	14.62	+.03	0.042	14.63	+.10
3	0.063	14.64	+.18	0.070	14.71	+.10	0.086	14.82	+.04	0.106	14.65	+.05	0.062	14.73	+.16
4	0.084	14.82	+.12	0.094	14.81	+.10	0.114	14.86	+.06	0.141	14.70	+.06	0.083	14.89	+.13
5	0.105	14.94	+.10	0.117	14.91	+.08	0.143	14.92	+.06	0.176	14.76	+.06	0.104	15.02	+.09
6	0.126	15.04	+.12	0.141	14.99	+.08	0.172	14.98	+.06	0.212	14.82	+.05	0.125	15.11	+.04
7	0.147	15.16	+.07	0.164	15.07	+.05	0.200	15.04	+.05	0.247	14.87	+.05	0.146	15.15	−.02
8	0.167	15.23	+.09	0.187	15.12	+.07	0.229	15.09	+.05	0.282	14.92	+.06	0.167	15.13	−.09
9	0.188	15.32	+.08	0.211	15.19	+.05	0.258	15.14	+.04	0.318	14.98	+.04	0.187	15.04	−.22
10	0.209	15.40	+.06	0.234	15.24	+.05	0.286	15.18	+.05	0.353	15.02	+.04	0.208	14.82	−.12
11	0.230	15.46	+.05	0.258	15.29	+.05	0.315	15.23	+.03	0.388	15.06	+.04	0.229	14.70	−.02
12	0.251	15.51	+.03	0.281	15.34	+.03	0.343	15.26	+.03	0.424	15.10	+.02	0.250	14.68	+.01
13	0.272	15.54	+.03	0.304	15.37	+.03	0.372	15.29	+.03	0.459	15.12	+.02	0.271	14.69	+.06
14	0.293	15.57	+.01	0.328	15.40	+.03	0.401	15.32	+.02	0.494	15.14	+.03	0.292	14.75	+.12
15	0.314	15.58	+.01	0.351	15.43	+.04	0.429	15.34	+.02	0.529	15.17	+.01	0.312	14.87	+.12
16	0.335	15.59	+.01	0.375	15.47	+.01	0.458	15.36	+.02	0.565	15.18	+.01	0.333	14.99	+.08
17	0.356	15.60	.00	0.398	15.48	+.01	0.487	15.38	+.01	0.600	15.19	−.01	0.354	15.07	+.04
18	0.377	15.60	.00	0.422	15.49	.00	0.515	15.39	+.01	0.635	15.18	−.05	0.375	15.11	+.01
19	0.398	15.60	−.02	0.445	15.49	−.01	0.544	15.40	−.02	0.671	15.13	−.13	0.396	15.12	−.02
20	0.419	15.58	−.06	0.468	15.48	−.04	0.572	15.38	−.06	0.706	15.00	−.18	0.416	15.10	−.09
21	0.440	15.52	−.34	0.492	15.44	−.15	0.601	15.32	−.18	0.741	14.82	−.13	0.437	15.01	−.19
22	0.461	15.18	−.76	0.515	15.29	−.51	0.630	15.14	−.27	0.776	14.69	−.11	0.458	14.82	−.15
23	0.482	14.42	−.16	0.539	14.78	−.19	0.658	14.87	−.17	0.812	14.58	−.02	0.479	14.67	−.07

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 80			No. 81			No. 82			No. 83			No. 84		
	d.			d.			d.			d.			d.		
0	0.000	14.84	+.03	0.000	14.57	.00	0.000	14.69	+.01	0.000	14.50	+.12	0.0	11.54	+.01
1	0.021	14.87	+.03	0.023	14.57	+.04	0.023	14.70	+.03	0.023	14.62	+.17	1.1	11.55	+.02
2	0.042	14.90	+.06	0.046	14.61	+.09	0.046	14.73	+.05	0.046	14.79	+.18	2.2	11.57	+.02
3	0.063	14.96	+.08	0.070	14.70	+.12	0.070	14.78	+.04	0.069	14.97	+.14	3.3	11.59	+.04
4	0.084	15.04	+.07	0.093	14.82	+.16	0.093	14.82	+.06	0.092	15.11	+.11	4.4	11.63	+.04
5	0.105	15.11	+.07	0.116	14.98	+.11	0.116	14.88	+.06	0.115	15.22	+.09	5.5	11.67	+.06
6	0.126	15.18	+.03	0.139	15.09	+.10	0.139	14.94	+.06	0.138	15.31	+.08	6.6	11.73	+.10
7	0.147	15.21	−.01	0.163	15.19	+.08	0.162	15.00	+.06	0.161	15.39	+.05	7.7	11.83	+.11
8	0.168	15.20	−.06	0.186	15.27	+.05	0.185	15.06	+.06	0.184	15.44	+.04	8.8	11.94	+.12
9	0.189	15.14	−.13	0.209	15.32	+.07	0.209	15.12	+.05	0.207	15.48	+.04	9.9	12.06	+.16
10	0.210	15.01	−.16	0.232	15.39	+.05	0.232	15.17	+.04	0.231	15.52	+.05	11.0	12.22	+.12
11	0.231	14.85	−.07	0.255	15.44	+.05	0.255	15.21	+.03	0.254	15.57	+.03	12.1	12.34	+.10
12	0.252	14.78	−.05	0.279	15.49	+.03	0.278	15.24	+.04	0.277	15.60	+.03	13.2	12.44	+.09
13	0.273	14.73	.00	0.302	15.52	+.02	0.301	15.28	+.02	0.300	15.63	+.02	14.4	12.53	+.04
14	0.294	14.73	+.04	0.325	15.54	+.03	0.324	15.30	.00	0.323	15.65	+.02	15.5	12.57	+.02
15	0.315	14.77	+.05	0.348	15.57	+.04	0.348	15.30	.00	0.346	15.67	+.02	16.6	12.59	+.01
16	0.336	14.82	+.12	0.372	15.61	+.01	0.371	15.30	+.01	0.369	15.69	+.01	17.7	12.60	+.01
17	0.356	14.94	+.15	0.395	15.62	+.02	0.394	15.31	.00	0.392	15.70	.00	18.8	12.61	−.01
18	0.377	15.09	+.10	0.418	15.64	+.01	0.417	15.31	−.02	0.415	15.70	.00	19.9	12.60	−.06
19	0.398	15.19	+.05	0.441	15.65	.00	0.440	15.29	−.04	0.438	15.70	−.02	21.0	12.54	−.17
20	0.419	15.24	+.01	0.464	15.65	−.04	0.463	15.25	−.12	0.461	15.68	−.14	22.1	12.37	−.32
21	0.440	15.25	−.04	0.488	15.61	−.38	0.487	15.13	−.34	0.484	15.54	−.74	23.2	12.05	−.39
22	0.461	15.21	−.33	0.511	15.23	−.48	0.510	14.79	−.08	0.507	14.80	−.28	24.3	11.66	−.11
23	0.482	14.88	−.04	0.534	14.75	−.18	0.533	14.71	−.02	0.530	14.52	−.02	25.4	11.55	−.01
	No. 85			No. 86			No. 87			No. 88			No. 89		
	d.			d.			d.			d.			d.		
0	0.000	14.50	+.01	0.000	14.40	+.07	0.000	14.80	+.02	0.000	14.90	.00	0.000	14.53	+.06
1	0.022	14.51	+.05	0.024	14.47	+.09	0.031	14.82	+.02	0.021	14.90	+.06	0.023	14.59	+.08
2	0.044	14.56	+.09	0.047	14.56	+.13	0.062	14.84	+.05	0.041	14.96	+.14	0.047	14.67	+.09
3	0.066	14.65	+.13	0.071	14.69	+.10	0.092	14.89	+.03	0.062	15.10	+.12	0.070	14.76	+.10
4	0.088	14.78	+.13	0.095	14.79	+.09	0.123	14.92	+.05	0.082	15.22	+.09	0.093	14.86	+.11
5	0.110	14.91	+.11	0.118	14.88	+.10	0.154	14.97	+.04	0.103	15.31	+.05	0.116	14.97	+.11
6	0.132	15.02	+.11	0.142	14.98	+.06	0.185	15.01	+.03	0.123	15.36	+.02	0.140	15.08	+.10
7	0.154	15.13	+.10	0.166	15.04	+.07	0.215	15.04	+.02	0.144	15.38	−.02	0.163	15.18	+.09
8	0.176	15.23	+.08	0.189	15.11	+.05	0.246	15.06	+.03	0.165	15.36	−.12	0.186	15.27	+.09
9	0.198	15.31	+.07	0.213	15.16	+.05	0.277	15.09	+.03	0.185	15.24	−.18	0.209	15.36	+.08
10	0.220	15.38	+.05	0.237	15.21	+.04	0.308	15.12	+.03	0.206	15.06	−.10	0.233	15.44	+.06
11	0.242	15.43	+.06	0.260	15.25	+.03	0.338	15.15	+.03	0.226	14.96	−.07	0.256	15.50	+.05

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 85			No. 86			No. 87			No. 88			No. 89		
	d.			d.			d.			d.			d.		
12	0.264	15.49	+.03	0.284	15.28	+.04	0.369	15.18	+.03	0.247	14.89	−.02	0.279	15.55	+.04
13	0.285	15.52	+.04	0.308	15.32	+.02	0.400	15.21	+.02	0.267	14.87	+.02	0.303	15.59	+.03
14	0.307	15.56	+.02	0.331	15.34	+.03	0.431	15.23	+.03	0.288	14.89	+.10	0.326	15.62	+.02
15	0.329	15.58	+.01	0.355	15.37	+.01	0.461	15.26	+.01	0.309	14.99	+.13	0.349	15.64	+.02
16	0.351	15.59	+.01	0.379	15.38	+.02	0.492	15.27	+.02	0.329	15.12	+.13	0.372	15.66	+.02
17	0.373	15.60	.00	0.402	15.40	.00	0.523	15.29	−.01	0.350	15.25	+.08	0.396	15.68	+.02
18	0.395	15.60	.00	0.426	15.40	−.01	0.554	15.28	−.01	0.370	15.33	+.05	0.419	15.70	.00
19	0.417	15.60	−.01	0.450	15.39	−.08	0.585	15.27	−.06	0.391	15.38	−.01	0.442	15.70	−.01
20	0.439	15.59	−.06	0.473	15.31	−.16	0.615	15.21	−.09	0.411	15.37	−.06	0.465	15.69	−.14
21	0.461	15.53	−.26	0.497	15.15	−.27	0.646	15.12	−.12	0.432	15.31	−.12	0.489	15.55	−.47
22	0.483	15.27	−.32	0.521	14.88	−.33	0.677	15.00	−.12	0.453	15.19	−.19	0.512	15.08	−.53
23	0.505	14.95	−.45	0.544	14.55	−.15	0.708	14.88	−.08	0.473	15.00	−.10	0.535	14.55	−.02

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Part	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 90			No. 91				No. 90			No. 91		
	d.			d.				d.			d.		
0	0.000	14.31	+.07	0.000	14.60	+.02	12	0.279	15.40	+.02	0.293	15.43	+.03
1	0.023	14.38	+.10	0.024	14.62	+.04	13	0.302	15.42	+.02	0.317	15.46	+.02
2	0.046	14.48	+.13	0.049	14.66	+.07	14	0.325	15.44	+.01	0.342	15.48	+.01
3	0.070	14.61	+.18	0.073	14.73	+.12	15	0.348	15.45	+.01	0.366	15.49	.00
4	0.093	14.79	+.14	0.098	14.85	+.16	16	0.371	15.46	+.01	0.391	15.49	.00
5	0.116	14.93	+.11	0.122	15.01	+.10	17	0.395	15.47	.00	0.415	15.49	.00
6	0.139	15.04	+.09	0.146	15.11	+.08	18	0.418	15.47	−.02	0.439	15.49	−.01
7	0.163	15.13	+.11	0.171	15.19	+.07	19	0.441	15.45	−.12	0.464	15.48	−.06
8	0.186	15.24	+.05	0.195	15.26	+.06	20	0.464	15.33	−.62	0.488	15.42	−.20
9	0.209	15.29	+.05	0.220	15.32	+.04	21	0.488	14.71	−.26	0.513	15.22	−.35
10	0.232	15.34	+.04	0.244	15.36	+.03	22	0.511	14.45	−.13	0.537	14.87	−.20
11	0.255	15.38	+.02	0.269	15.39	+.04	23	0.534	14.32	−.01	0.561	14.67	−.07

vations determined. Mean light curves were thus derived for each of the groups. In this way, the periods were reduced to a common standard, but the magnitudes were not changed and the simple means of the magnitudes of all the observations corresponding to each of the 48 equal parts were taken. The number of observations entering into each mean value for the three groups, is, in general, between 20 and 30. The results are given in Table XXVII. The parts are numbered from 0 to 47, and are given in the first column. The second, third, and fourth columns give the corresponding mean values of the magnitude for the three groups of varia-

TABLE XXVII

MEAN MAGNITUDES

Part	Gr. 1	Gr. 2	Gr. 3	Mean All	Mean M. W.	M. W. —A	Part	Gr. 1	Gr. 2	Gr. 3	Mean All	Mean M. W.	M. W. —A
0	14.33	14.40	14.42	14.38	14.42	+.04	24	15.49	15.41	15.31	15.41	15.34	−.07
1	14.32	14.42	14.51	14.41	14.54	+.13	25	15.58	15.55	15.27	15.44	15.48	+.04
2	14.41	14.47	14.45	14.44	14.56	+.12	26	15.61	15.46	15.32	15.44	15.42	−.02
3	14.42	14.55	14.60	14.52	14.49	−.03	27	15.68	15.54	15.33	15.51	15.59	+.08
4	14.56	14.63	14.64	14.61	14.67	+.06	28	15.61	15.59	15.40	15.53	15.46	−.07
5	14.58	14.66	14.67	14.63	14.74	+.11	29	15.60	15.48	15.39	15.48	15.20	−.28
6	14.60	14.69	14.64	14.64	14.77	+.13	30	15.57	15.48	15.36	15.48	15.57	+.09
7	14.75	14.80	14.75	14.77	14.75	−.02	31	15.64	15.53	15.41	15.53	15.52	−.01
8	14.74	14.89	14.78	14.79	14.86	+.07	32	15.52	15.54	15.41	15.49	15.56	+.07
9	14.89	14.93	14.84	14.88	14.83	−.05	33	15.64	15.50	15.36	15.50	15.54	+.04
10	14.98	14.90	14.88	14.92	14.92	.00	34	15.58	15.48	15.40	15.47	15.43	−.04
11	15.05	14.98	14.91	14.97	14.92	−.05	35	15.75	15.53	15.42	15.53	15.62	+.09
12	15.01	15.02	14.90	14.98	14.93	−.05	36	15.60	15.52	15.45	15.52	15.53	+.01
13	15.10	15.08	14.99	15.05	15.07	+.02	37	15.63	15.61	15.42	15.56	15.73	+.17
14	15.09	15.20	15.02	15.10	15.09	−.01	38	15.61	15.64	15.48	15.56	15.66	+.10
15	15.18	15.19	15.05	15.13	15.03	−.10	39	15.50	15.49	15.48	15.49	15.68	+.19
16	15.22	15.26	15.18	15.22	15.27	+.05	40	15.64	15.60	15.49	15.58	15.73	+.15
17	15.29	15.26	15.14	15.22	15.25	+.03	41	15.57	15.62	15.46	15.55	15.71	+.16
18	15.37	15.27	15.16	15.27	15.31	+.04	42	15.49	15.47	15.32	15.44	15.76	+.32
19	15.46	15.38	15.16	15.37	15.41	+.04	43	15.21	15.38	15.19	15.26	15.44	+.18
20	15.42	15.30	15.22	15.33	15.28	−.05	44	15.02	15.32	14.92	15.08	15.18	+.10
21	15.43	15.45	15.29	15.39	15.49	+.10	45	14.63	14.80	14.71	14.72	14.78	+.06
22	15.45	15.45	15.24	15.39	15.46	+.07	46	14.50	14.61	14.67	14.59	14.53	−.06
23	15.62	15.42	15.26	15.41	15.36	−.05	47	14.34	14.55	14.51	14.47	14.61	+.14

bles referred to above. The fifth column contains the mean magnitudes of all the 30 stars for all the measurements, and the sixth column, the corresponding mean values derived from the Mt. Wilson photographs only. The seventh column gives the differences between the last two, found by subtracting the values in the fifth

column from those in the sixth column. Smooth curves were drawn through these results, and graphical representations of them are given in Plate I, Figs. 2 to 6. The largest deviation of a mean magnitude from the smooth curve in the case of the first group is +0.12, and the mean, ±0.04; for the second group, +0.09, and ±0.04; and for the third group, −0.07, and ±0.02. From these smooth curves were derived the elements given in Table XXVIII, where the quantities concerned are arranged according to length of period. The differences between the mean periods are small amounting altogether to only $0^d.150$. The first column in the table gives the group, the second column, the mean period, and the third column, the mean distance from the centre of the cluster. The fourth, fifth, and sixth columns give, respectively, the mean maximum magnitude, the mean minimum

TABLE XXVIII

30 VARIABLE STARS GROUPED ACCORDING TO LENGTH OF PERIOD

Group	Mean Period	Mean Dist.	Mean Max.	Mean Min.	Range	N S P F	Inc.	Dec.
	d.	′						
1	0.484	4.9	14.32	15.63	1.31	6, 4, 5, 5	0.37	0.07
2	0.543	3.3	14.40	15.57	1.17	4, 6, 6, 4	0.39	0.06
3	0.634	3.6	14.45	15.48	1.03	6, 4, 4, 6	0.27	0.04

magnitude, and the range. The seventh column contains the number of the stars in the northern, the southern, the preceding, and the following part of the cluster. The last two columns give the mean maximum rate of increase and decrease in brightness, expressed in magnitudes, for one forty-eighth part of the period. An inspection of the table, which contains too few groups for definite conclusions, indicates that the length of period has little or no relation to the distances or positions of the variables. With increasing period, however, there does appear to be, in general, a decrease in the maximum, and an increase in the minimum magnitude, and hence a well marked decrease in the range. This is apparently accompanied by a decrease in the maximum rate of increase and decrease of the light. These results are in harmony with those found for the variables in Messier 3, as stated on page 87 of the present volume. The curve obtained from the Mount Wilson plates appears to be somewhat anomalous. For the variables of Messier 3, as given on page 88 of this volume and illustrated in Figs. 5 and 6, of Plate III, Part I, a higher and sharper maximum was obtained when only the Mount Hamilton plates of 10^m exposure were employed. An examination of Figs. 5 and 6, Plate I, shows that

for the variables in Messier 5, the maximum derived from the Mt. Wilson plates of 10^m exposure is slightly lower than that derived from all the plates. This is probably due to the fact, referred to on page 109, that the Mt. Wilson plates, owing to the great size of the telescope, were over exposed for the stars under discussion, rendering the images too dense for easy comparison. There is also an indication of a decided drop in brightness just before the beginning of the increase in light. Owing to the relatively small number of observations on the Mt. Wilson plates, compared to the whole number, and the 48 parts into which they were divided, the groups are small, in one case consisting of only 2 observations, and hence greater irregularities and uncertainties might be expected.

Variable, No. 62

Special interest attaches to the 8 stars having double maxima and minima according to the explanation given on page 154. On this account one of these variables, No. 62, was selected for more careful study. In general, only a single sequence of comparison stars was used for the measures of the variables in Messier 5, given in Tables XXIII and XXIV. The distance of the variable from the comparison stars was, in many cases, therefore, inconveniently large. In order to obtain more precise measurements of No. 62, a special sequence was selected composed of the five stars of the required brightness nearest to the variable. They were designated a′, b′, c′, d′, and e′, and their positions were found by comparison with three adjacent stars, Variables Nos. 32, 55, and 62, whose coordinates are given in H.A. **38**, 240. The magnitudes of these comparison stars were determined by comparing them directly with the stars of the primary sequence. They were measured twice by Miss Leland and twice by the writer, and the results are given in Table XXIX, in which the first column contains the designations of the stars, and the second and third columns, their rectangular coordinates from the centre of the cluster. The next four columns give the different determinations of magnitude, and the eighth column, the mean values. The ninth column gives the corresponding residuals from the means. Since this sequence is rather distant from the primary sequence, the accidental errors in the estimates of magnitude might be expected to be somewhat large. Accordingly, the intervals between the stars in grades were also estimated by both observers, and the sums of the mean results are given in the tenth column. The results contained in the eighth and the tenth columns were then plotted, with magnitudes as abscissas and grades as ordinates, and a smooth curve

was drawn through them. The magnitudes derived from the reading of this curve are given in the eleventh column. The means of the magnitudes in the eighth and eleventh columns were adopted as the final magnitudes for this discussion and are given in the last column.

TABLE XXIX

SPECIAL SEQUENCE FOR NO. 62

Desig.	X	Y	Magnitudes					Resids.	Gr.	G. Magns.	Adopt. Magns.
			L.		B.		Means				
	″	″									
a′	+121.1	−141.7	14.68	14.66	14.40	14.61	14.59	09, 07, *19*, 02	0	14.58	14.58
b′	+254.6	−233.2	14.89	14.99	14.71	15.02	14.90	*01*, 09, *19*, 12	4.0	14.92	14.91
c′	+195.6	−175.6	15.37	15.27	15.16	15.16	15.24	13, 03, *08*, *08*	7.1	15.24	15.24
d′	+194.3	−207.0	15.47	15.57	15.26	15.26	15.39	08, 18, *13*, *13*	8.3	15.37	15.38
e′	+259.9	−218.1	15.73	15.68	15.47	15.58	15.62	11, 06, *15*, *04*	10.5	15.64	15.63

The results of the original measures of No. 62, compared in the usual manner with the stars of the primary sequence, are given in Table XXIII, page 137. The results obtained by the use of the special sequence given in Table XXIX are shown in Table XXX, in which the first column gives the Julian Day and decimal, the second column, the magnitude determined by Miss Leland, and the third column, the magnitude determined by the writer. The fourth column contains the mean magnitudes, and the fifth column, the corresponding residuals. The computed phases of the observations, taken from Table XXIII, and derived from the same formula as that given in the Table of Elements, page 158, J. D. 2415021.244 + $0^d.562815$ E, for component *a*, are given in the sixth column. The corresponding residuals from the smooth curve drawn through all the observations are given in the seventh column. The light curve indicated by these observations agrees with that derived from the regular measures given in Table XXIII. It is shown graphically in Fig. 2, Plate II, and verifies the double oscillation which occurs in the usual half-day period. Many rather large residuals occur, however, in spite of the care used in the measurements. In order to determine whether these are in error, a second measure was made of each of the plates on which the residuals amounted to 0.20 magn., or more. A comparison of the results of the two measures with the mean magnitudes given in Table XXX is contained in Table XXXI. The largest difference for any star between the original result and that obtained by the second measurement is +0.17 magn., and the mean difference is ±0.071 magn. The mean residual from the smooth curve for these plates is ±0.31 magn. for the original measures, and

TABLE XXX

VARIABLE NO. 62. SECOND MEASUREMENTS

J. D.	Magnitudes			Res.	Phase	Res.	Corr. Phase	Res.	J. D.	Magnitudes			Res.	Phase	Res.	Corr. Phase	Res.
	L.	B.	Means							L.	B.	Means					
d.					d.		d.		d.					d.		d.	
3346.540	15.56	15.63	15.60	04, 03	0.465	29	0.447	24	3717.517	14.80	14.80	14.80	00, 00	0.547	08	0.544	12
3366.544	15.16	15.30	15.23	07, 07	0.208	02	0.190	11	" .692	15.46	15.38	15.42	04, 04	0.159	05	0.156	07
3369.698	14.64	..	14.64	A, ..	0.548	07	0.530	09	" .817	14.70	14.64	14.67	03, 03	0.284	02	0.281	04
3370.528	14.64	14.80	14.72	08, 08	0.252	00	0.234	11	3724.535	14.80	14.74	14.77	03, 03	0.249	02	0.246	02
3371.529	15.16	15.12	15.14	02, 02	0.128	14	0.110	03	" .676	14.98	15.12	15.05	07, 07	0.390	22	0.387	05
3374.502	14.70	14.64	14.67	03, 03	0.286	02	0.269	02	3748.572	14.80	14.70	14.75	05, 05	0.085	20	0.083	22
" .538	14.70	..	14.70	A, ..	0.322	07	0.305	03	3775.556	14.70	14.64	14.67	03, 03	0.053	09	0.052	10
3376.502	14.70	14.75	14.72	02, 03	0.035	01	0.018	08	3960.869	15.16	15.24	15.20	04, 04	0.200	08	0.204	07
" .543	14.70	14.74	14.72	02, 02	0.076	16	0.059	09	4014.745	14.84	14.74	14.79	05, 05	0.046	06	0.052	02
" .584	15.12	15.24	15.18	06, 06	0.117	00	0.100	08	4037.635	15.36	15.24	15.30	06, 06	0.423	06	0.428	07
" .677	15.39	15.31	15.35	04, 04	0.210	14	0.193	01	" .663	15.02	14.91	14.96	06, 05	0.451	38	0.456	39
3377.578	14.64	14.64	14.64	00, 00	0.549	08	0.532	08	4041.675	14.80	14.80	14.80	00, 00	0.524	00	0.530	07
3378.579	15.46	15.38	15.42	04, 04	0.424	05	0.407	06	4052.600	15.16	15.24	15.20	04, 04	0.192	13	0.198	09
3380.500	14.98	15.08	15.03	05, 05	0.094	00	0.077	10	4058.548	14.80	14.91	14.86	06, 05	0.512	03	0.518	02
" .602	15.60	15.50	15.55	05, 05	0.196	25	0.179	18	" .662	14.84	14.80	14.82	02, 02	0.063	01	0.070	06
3390.604	14.98	14.90	14.94	04, 04	0.067	11	0.050	18	" .780	15.16	15.24	15.20	04, 04	0.181	17	0.188	15
3408.568	14.64	14.58	14.61	03, 03	0.021	08	0.005	01	" .854	14.64	14.64	14.64	00, 00	0.255	06	0.262	03
3409.544	15.36	15.38	15.37	01, 01	0.434	00	0.418	00	4066.635	15.40	15.38	15.39	01, 01	0.157	01	0.164	02
" .623	15.02	14.91	14.96	06, 05	0.513	08	0.497	07	4067.636	14.80	14.70	14.75	05, 05	0.032	05	0.039	04
3411.603	14.84	14.84	14.84	00, 00	0.242	00	0.226	19	4069.560	14.54	14.58	14.56	02, 02	0.268	10	0.275	07
3412.560	14.91	14.91	14.91	00, 00	0.073	05	0.057	11	" .795	14.98	15.08	15.03	05, 05	0.503	01	0.510	11
3413.569	14.98	15.02	15.00	02, 02	0.519	17	0.503	01	4070.655	14.80	14.91	14.86	06, 05	0.237	05	0.244	10
3414.620	..	15.12	15.12	A, ..	0.445	23	0.429	25	4071.538	14.70	14.58	14.64	06, 06	0.558	06	0.003	02
3415.489	15.22	15.20	15.21	01, 01	0.188	13	0.172	16	" .747	15.16	15.12	15.14	02, 02	0.204	11	0.211	07
" .531	15.08	15.16	15.12	04, 04	0.230	10	0.214	06	4072.538	15.41	15.31	15.36	05, 05	0.432	01	0.439	01
" .572	14.54	14.70	14.62	08, 08	0.271	03	0.255	08	" .745	14.84	14.91	14.88	04, 03	0.076	00	0.083	08
" .614	14.70	14.64	14.67	03, 03	0.313	04	0.297	03	4073.553	14.84	14.84	14.84	00, 00	0.321	08	0.328	07
3419.548	14.50	14.58	14.54	04, 04	0.307	16	0.291	10	" .758	14.70	14.74	14.72	02, 02	0.526	07	0.533	00
3422.494	15.70	15.56	15.63	07, 07	0.439	26	0.423	26	4074.561	15.16	15.24	15.20	04, 04	0.204	05	0.211	01
" .591	14.70	14.84	14.77	07, 07	0.536	02	0.520	04	4085.663	..	14.84	14.84	A, ..	0.049	10	0.057	04
3423.506	14.64	14.74	14.69	05, 05	0.326	10	0.310	00	4086.608	15.16	15.42	15.29	13, 13	0.432	08	0.440	08
3666.649	14.84	14.90	14.87	03, 03	0.333	03	0.328	10	4092.573	..	..	..	.. ..	..	..	..	..
3673.681	14.64	14.58	14.61	03, 03	0.048	13	0.043	11	4093.532	..	..	..	.. ..	..	..	..	..
3693.638	14.60	..	14.60	A, ..	0.306	09	0.302	05	" .762	14.64	14.75	14.70	06, 05	0.269	04	0.277	07
3694.577	..	15.24	15.24	A, ..	0.120	01	0.116	04	4133.607	15.46	15.38	15.42	04, 04	0.154	05	0.163	06
" .615	15.26	15.24	15.25	01, 01	0.158	12	0.154	10	4147.519	14.60	14.64	14.62	02, 02	0.559	08	0.006	00
3695.519	14.98	15.12	15.05	07, 07	0.499	00	0.495	00	4437.629	14.64	14.70	14.67	03, 03	0.256	03	0.274	03
" .561	14.64	14.64	14.64	00, 00	0.541	09	0.537	06	4795.632	14.98	14.70	14.84	14, 14	0.309	14	0.336	01
" .602	14.70	14.58	14.64	06, 06	0.019	05	0.015	00	4846.568	14.80	14.80	14.80	00, 00	0.028	10	0.056	00
" .644	14.70	14.80	14.75	05, 05	0.061	05	0.057	05	4860.582	14.60	14.58	14.59	01, 01	0.535	16	0.000	03
3698.504	15.12	15.08	15.10	02, 02	0.107	02	0.103	02	4876.513	15.35	15.35	15.35	00, 00	0.144	00	0.173	02
3699.499	14.91	14.70	14.80	11, 10	0.539	06	0.535	08	4886.535	14.80	14.84	14.82	02, 02	0.036	11	0.065	03
" .542	14.70	14.64	14.67	03, 03	0.019	02	0.015	04	5560.608	15.36	15.31	15.34	02, 03	0.419	01	0.462	01
" .584	..	14.84	14.84	A, ..	0.061	04	0.057	04	5562.605	15.46	15.38	15.42	04, 04	0.165	04	0.208	18
3713.513	15.46	15.08	15.27	19, 19	0.483	06	0.480	06	5563.594	14.98	14.75	14.86	12, 11	0.028	16	0.071	04
" .680	14.94	14.98	14.96	02, 02	0.087	01	0.084	01	5579.551	14.70	14.58	14.64	06, 06	0.226	48	0.269	01

J. D.	Magnitudes			Res.	Phase	Res.	Corr. Phase	Res.	J. D.	Magnitudes			Res.	Phase	Res.	Corr. Phase	Res.
	L.	B.	Means							L.	B.	Means					
d.					d.		d.		d.					d.		d.	
5581.558	14.70	14.74	14.72	02, 02	0.545	00	0.025	06	9533.816	15.38	15.38	15.38	00, 00	0.153	01	0.171	01
5899.564	14.80	14.80	14.80	00, 00	0.561	10	0.046	07	" .888	14.70	14.80	14.75	05, 05	0.225	32	0.243	01
5901.555	14.90	14.91	14.90	00, 01	0.300	23	0.348	02	" .914	..	14.74	14.74	A, ..	0.251	01	0.269	01
" .646	15.36	15.24	15.30	06, 06	0.391	03	0.439	07	" .947	14.60	14.64	14.62	02, 02	0.284	03	0.302	03
6633.655	14.80	14.91	14.86	06, 05	0.178	51	0.232	00	9537.761	15.46	15.38	15.42	04, 04	0.158	04	0.176	05
6634.509	14.84	14.84	14.84	00, 00	0.469	44	0.523	05	" .786	15.38	15.38	15.38	00, 00	0.183	02	0.201	10
" .566	14.64	14.64	14.64	00, 00	0.526	15	0.047	10	" .812	15.02	15.02	15.02	00, 00	0.209	20	0.227	02
" .682	15.26	15.22	15.24	02, 02	0.079	33	0.133	04	" .836	14.70	14.74	14.72	02, 02	0.233	26	0.251	00
7021.639	15.26	15.31	15.28	02, 03	0.382	07	0.436	09	" .874	14.70	14.74	14.72	02, 02	0.271	06	0.289	09
7023.629	15.40	15.38	15.39	01, 01	0.121	16	0.175	02	" .899	14.70	14.74	14.72	02, 02	0.296	06	0.314	02
" .678	15.12	15.38	15.25	13, 13	0.170	13	0.224	19	" .924	14.80	14.84	14.82	02, 02	0.321	06	0.339	03
8157.558	14.80	14.70	14.75	05, 05	0.541	02	0.025	09	" .950	14.84	14.91	14.88	04, 03	0.347	05	0.365	09

0/

±0.28 magn. for the second measures. Since no material change would be made by the substitution of the results of the second measures, the original magnitudes have been retained in the discussion. The general accordance of the two results appears to show that the large residuals from the smooth curve given in the seventh column of Table XXX are not due in large part to accidental errors of measurement. They may be caused by an error or by lack of uniformity in the period, or by peculiarities or defects on the photographs not appreciable to the observers. A plot was then made of those changes in the epoch of maximum by which large residuals would be corrected, in all cases where their value amounted to 0.15 magn., or more. Julian dates were used as abscissas and corrections to epoch as ordinates and a smooth curve was drawn through them. In many cases, a change of epoch made little difference in the accordance, in other cases, a change was necessary to prevent large discordance. In the former case, dots have been employed in the figure, in the latter case, crosses. Considerable discordance in the results is indicated for the early plates. A graphical representation of this curve is given in Fig. 9, Plate II. It may be represented by the term $+0^d.055 \sin (0°.0158\,E + 214°.4)$. By the use of this term the formula for the returns of maximum becomes J. D. $2415021.244 + 0^d.562815\,E + 0^d.055 \sin (0°.0158\,E + 214°.4)$. The phases and residuals from the smooth curve obtained by the use of this formula are given in the eighth and ninth columns of Table XXX. The corresponding light curve is given in Fig. 4, Plate II. The mean deviation of the individual measures by the use of the simple formula is 0.094 magn., and by the complete formula, 0.067 magn. In the former case, the largest residual is −0.51 magn., and in the latter case it is −0.39 magn. For the corrected results five residuals occur whose value is as great as two-tenths of a

magnitude; −0.24 on X 6637, +0.25 on X 7000, +0.26 on X 7036, −0.22 on X 7661, and −0.39 on X 8453. As given in Table XXIII, page 112, the quality of these plates was estimated on a scale of 1 to 5, as 3, 3, 3.5, 3.5, and 3.5, respectively. Although of rather inferior quality, this fact in itself is not sufficient to explain the discordance. Remarks in regard to them, however, made at the time of the observations are as follows: X 6637. Image of variable faint and possibly defective. X 7000. Difficult, images very hazy and poor. X 7036. Images very faint, measure doubtful, variable surely faint. X 7661. Images very faint, measure doubtful. X 8453. Images very faint, measure doubtful. In general, it has been found that measures

TABLE XXXI

LARGE RESIDUALS

J. D.	Plate	Meas.	Remeas.	Diff.	Orig. Res.	Sec. Res.	J. D.	Plate	Meas.	Remeas.	Diff.	Orig. Res.	Sec. Res.
d.							d.						
3346.540	X 6637	15.60	15.60	00	29	29	5901.555	X 10458	14.90	14.85	05	23	18
3380.602	X 6838	15.55	15.40	15	25	10	6633.655	X 10804	14.86	14.90	04	51	47
3414.620	X 7000	15.12	15.25	13	23	10	6634.509	X 10805	14.84	14.80	04	44	48
3422.494	X 7036	15.63	15.50	13	26	13	" .682	X 10808	15.24	15.25	01	33	32
3724.676	X 7603	15.05	15.10	05	22	17	9533.888	MW 84	14.75	14.85	10	32	22
3748.572	X 7661	14.75	14.80	05	20	15	9537.812	MW107	15.02	14.85	17	20	37
4037.663	X 8453	14.96	15.00	04	38	34	" .836	MW108	14.72	14.65	07	26	33
5579.551	X 10256	14.64	14.60	04	48	52							

of very faint images are unreliable. It seems not improbable, therefore, that the above remarks explain the large residuals derived from these plates. The light curve obtained by taking the means of five observations arranged in order of phase is shown in the upper curve of Fig. 6, Plate II. It is also given in Table XXXII. From this it appears that the two maxima are equal in brightness, but that the first minimum is about 0.06 or 0.08 magn. fainter than the second. In view of the difficulties of measurement, however, and the unequal distribution in phase of the observations, there may be some doubt as to the genuineness of this small difference in magnitude at minimum.

In this connection a reexamination was made of some of the results obtained for the variables in Messier 3 and ω Centauri. The periods of 110 variables in Messier 3 are given in Part 1 of the present volume. All of these appear to be of the ordinary cluster type. For No. 37 no period was found. The remark on page 65 states, " No satisfactory period has been found for this star. The variation is sure, although the range is rather small. A period of about $0^d.5$ satisfies many of the observations

fairly well." At the time this discussion was made the idea of a double maximum had not occurred to the writer. A trial was made unsuccessfully to adapt the observations to a period of about a quarter of a day, since it was evidently a submultiple of about one day. A period, however, of about a third of a day, $0^d.32635$, was found to satisfy the observations fairly well. This period is somewhat greater

TABLE XXXII

LIGHT CURVE OF VARIABLE NO. 62

Part	Phase	Magn.	Δ	Part	Phase	Magn.	Δ
	d.				d.		
0	0.000	14.65	+.03	12	0.281	14.65	+.02
1	0.023	14.68	+.08	13	0.305	14.67	+.14
2	0.047	14.76	+.10	14	0.328	14.81	+.16
3	0.070	14.86	+.15	15	0.352	14.97	+.16
4	0.094	15.01	+.14	16	0.375	15.13	+.12
5	0.117	15.15	+.12	17	0.399	15.25	+.05
6	0.141	15.27	+.09	18	0.422	15.30	−.02
7	0.164	15.36	.00	19	0.446	15.28	−.08
8	0.188	15.36	−.12	20	0.469	15.20	−.13
9	0.211	15.24	−.29	21	0.492	15.07	−.21
10	0.234	14.95	−.25	22	0.516	14.86	−.15
11	0.258	14.70	−.05	23	0.539	14.71	−.06

than one-half the mean period, $0^d.541$, of the variables in Messier 3. Nineteen variables in the cluster, however, have periods between $0^d.60$ and $0^d.71$, or about twice that of No. 37. It seems probable, therefore, that this star is an isolated case of a variable having a double maximum. On this assumption the real period of No. 37 becomes $0^d.65270$. In Table XXXIII are given the results of this discussion. The first two columns give the Julian date and the corresponding magnitude repeated for convenience from page 22 of this volume. The third column gives the phase, and the fourth column, the residual from the smooth curve, by the use of the formula, J. D. 2415021.390 + $0^d.65270_E$. While, in general, these results are accordant, numerous rather large deviations from the smooth curve occur which have the appearance of being systematic and secular. The largest deviation from the smooth curve is −0.70 and the mean is ±0.17. The addition of a sine term, to provide for a secular oscillation in the length of the period, removes for the most part these discordances. In Table XXXIII the fifth and sixth columns contain the phases and deviations from a smooth curve when the following formula is employed: — J. D. 2415021.390 + $0^d.65270_E$ + $0^d.035$ sin ($0°.1468$ E + $153°.2$). With this formula the largest deviation from the smooth curve

is +0.26; and the mean, ±0.10. It is possible that similar stars may exist among the other variables in Messier 3, whose periods were not determined.

The variables in ω Centauri were divided in H.A. **38**, page 132, into three subclasses, called a, b, and c. Subclass c comprised the stars having small range with continuous variation in light, and short periods, whose mean length, $0^d.395$, is about one-half that of the mean length, $0^d.752$, of the variables of Subclass b.

TABLE XXXIII

VARIABLE 37 IN MESSIER 3. PERIOD $0^d.65270$

J. D.	Magn.	Phase	Res.	Revis. Phase	Revis. Res.	J. D.	Magn.	Phase	Res.	Revis. Phase	Revis. Res.
d.		d.		d.		d.		d.		d.	
3372.527	16.36	0.510	00	0.487	*13*	5160.741	..	..	..	..	..
3377.517	16.00	0.278	40	0.255	17	" .779	15.44	0.364	14	0.366	19
3383.513	15.44	0.400	*26*	0.379	10	" .788	15.54	0.373	21	0.375	*22*
3384.514	15.54	0.095	*58*	0.074	*10*	" .800	15.70	0.385	25	0.387	25
3664.674	15.49	0.247	*63*	0.264	*17*	" .809	15.49	0.394	*14*	0.396	*13*
3691.533	15.13	0.345	*10*	0.365	*12*	" .822	16.00	0.407	07	0.409	00
" .643	16.36	0.455	*02*	0.475	*12*	" .830	16.23	0.415	11	0.417	09
3692.540	15.28	0.047	*15*	0.067	*24*	" .843	16.36	0.428	10	0.430	11
4067.520	16.00	0.377	65	0.410	*04*	" .853	16.23	0.438	*08*	0.440	*11*
4071.577	16.31	0.518	*01*	0.550	26	5161.713	15.18	0.645	01	0.648	*02*
4073.585	15.28	0.568	*42*	0.600	00	" .722	15.28	0.001	08	0.004	08
4077.492	15.28	0.559	*60*	0.591	*04*	" .735	15.18	0.014	*04*	0.017	*03*
" .581	15.18	0.648	01	0.027	*04*	" .744	15.13	0.023	*13*	0.026	*08*
4078.492	15.28	0.253	*70*	0.285	*14*	" .756	15.28	0.035	*04*	0.038	04
4079.493	15.18	0.602	*05*	0.633	*03*	" .764	15.28	0.043	*12*	0.046	*01*
" .579	15.54	0.035	21	0.066	05	" .777	15.54	0.056	02	0.059	13
4437.550	15.49	0.326	26	0.312	24	" .786	15.70	0.065	*03*	0.068	19
4456.502	15.18	0.350	*06*	0.333	*03*	" .799	16.00	0.078	10	0.081	15
" .575	16.00	0.423	*21*	0.406	05	" .808	16.06	0.087	02	0.090	05
4839.480	16.49	0.193	01	0.160	00	" .820	16.12	0.099	00	0.102	*08*
4840.523	15.85	0.584	45	0.551	*18*	" .828	16.49	0.107	25	0.110	19
4841.472	16.36	0.227	06	0.194	00	" .840	16.23	0.119	*10*	0.122	*17*
" .503	16.12	0.258	13	0.225	*01*	" .850	16.49	0.129	10	0.132	02
" .571	15.28	0.326	05	0.293	*07*	" .864	16.49	0.143	02	0.146	00
" .603	15.28	0.358	01	0.325	06	" .873	16.60	0.152	11	0.155	11

These characteristics are also true of the stars in Messier 5 having double maxima. In Chapter V, of H.A. **38**, an elaborate study was made of four variables, among them No. 35, a typical example of Subclass c. The period there found was $0^d.386842$. On the theory of a double maximum, its period becomes $0^d.793684$. If the observations are plotted with this period, the two halves of the curve appear to be equal, as might be expected. It is possible that many of the periods of the

variables of Subclass c in ω Centauri should be doubled. Other stars of very short period may belong to the same class, such as XX Cygni, period $0^d.135$. Differences in the form of the light curve at successive maxima might thus be accounted for.

If the variable of double maximum is formed, as indicated above, by the union of two variable stars of the ordinary cluster type, this fact should be apparent in the resultant light curve. To test this, we may, in the first place, combine the light of two stars of cluster type, and study the light curve thus obtained. Secondly, we may resolve the light of a typical variable of double maximum into that of two possible components and determine their light curves. Computed values for both cases are given in Table XXXIV. All the periods are divided into 24 equal parts. The first and second columns give the typical light curve of cluster variables. It is derived from all the observations of the 30 selected variables in Messier 5, as described on page 164, and shown graphically in Plate I, Fig. 5. The first and third columns give the same light curve, but with alternating maxima. The corresponding magnitudes obtained by combining two such stars, with alternating maxima, are given in the fourth column. The results are shown graphically in Plate II, Fig. 5, in which B is the curve formed by the combination of the two equal variables with alternating maxima, A and A′. The computations for the magnitudes of the curve B are greatly facilitated by the use of the table given in H.A. 33, 287. The increase of light in the curve B is considerably more rapid then the decrease, while in actual stars of double maxima the rate of increase is more nearly equal to that of decrease. It may be better, therefore, to resolve some real light curves of this class into possible components. The fifth column of Table XXXIV, in connection with the first, gives the light curve of Variable 62, and the sixth and seventh columns, the corresponding magnitudes of the light curves of two possible components, the combined light at all phases being equal to the corresponding magnitude of No. 62. The number of such possible solutions is infinite. The two components given in the table, though unequal to each other, appear to have light curves of the ordinary cluster type. Curves more nearly equal could be derived, but probably not precisely equal, since the two halves of the original curves are unequal. These results are illustrated in Plate II, Fig. 6, in which are given the light curve of No. 62, and C and D, the corresponding curves derived from it. Omitting No. 62, the mean light curve of the remaining 7 stars of this class in Messier 5 was computed, and results for this mean curve, similar to those found for No. 62, are given in the eighth, ninth, and tenth columns. These results are shown graphically in Plate II, Fig. 7, where the mean light curve of the 7 variables is given and E and F are two possible components. A is the same light curve as that shown in Plate I, Fig. 5.

When this is taken as one of the components, the other component is G, a curve of irregular form. It can be reduced to the usual cluster type by the introduction also of modifications in A, as shown by the curves E and F. It seems not improbable, therefore, that the light curves of the variables having double maxima may be formed by the union of two stars having light curves approximately those of the typical cluster variables. If the components of such a variable were only optically double, the periods would seldom, or never, be precisely equal, and after the lapse of a greater or less interval of time, the maximum of one star would approach that of the other, and we should have at last the appearance of an ordinary variable with a single maximum and minimum. Such a variable has been looked for without success. The components of such variables must, therefore, form physical doubles. Also, if the ordinary cluster variable is a spectroscopic binary, as many astronomers have thought probable, a single variable of double maximum must consist of at least four components.

TABLE XXXIV

COMPONENT LIGHT CURVES

Part	A	A′	B	No. 62	C	D	Mean of 7	E	F
0	14.38	15.43	14.03	14.65	15.03	15.97	14.71	15.06	16.12
1	14.45	15.46	14.09	14.68	15.05	16.02	14.72	15.05	16.16
2	14.57	15.48	14.18	14.76	15.16	16.04	14.77	15.10	16.21
3	14.69	15.50	14.27	14.86	15.29	16.08	14.87	15.23	16.25
4	14.80	15.51	14.35	15.01	15.50	16.10	14.99	15.38	16.28
5	14.91	15.52	14.42	15.15	15.72	16.12	15.11	15.54	16.32
6	15.01	15.53	14.49	15.27	15.90	16.15	15.19	15.65	16.34
7	15.10	15.54	14.55	15.35	16.03	16.17	15.22	15.75	16.29
8	15.19	15.55	14.60	15.36	16.10	16.12	15.20	15.84	16.08
9	15.27	15.44	14.60	15.24	16.21	15.82	15.11	15.91	15.82
10	15.35	15.05	14.44	14.94	16.30	15.30	14.95	15.97	15.49
11	15.40	14.56	14.15	14.70	16.37	14.96	14.81	16.02	15.24
12	15.43	14.38	14.03	14.65	16.45	14.88	14.74	16.05	15.12
13	15.46	14.45	14.09	14.67	16.52	14.89	14.72	16.08	15.09
14	15.48	14.57	14.18	14.81	16.58	15.05	14.75	16.10	15.13
15	15.50	14.69	14.27	14.96	16.63	15.22	14.84	16.12	15.24
16	15.51	14.80	14.35	15.13	16.65	15.43	14.97	16.13	15.43
17	15.52	14.91	14.42	15.25	16.70	15.58	15.10	16.14	15.62
18	15.53	15.01	14.49	15.30	16.70	15.65	15.19	16.15	15.76
19	15.54	15.10	14.55	15.28	16.45	15.73	15.23	16.16	15.83
20	15.55	15.19	14.60	15.21	16.16	15.80	15.22	16.05	15.90
21	15.44	15.27	14.60	15.07	15.85	15.79	15.14	15.81	15.97
22	15.05	15.35	14.44	14.86	15.40	15.90	15.00	15.53	16.02
23	14.56	15.40	14.15	14.71	15.14	15.93	14.80	15.20	16.07

VARIABLE NO. 77

The variable stars in clusters have in general been assumed in these discussions to be undergoing constant change in light, without secondary or irregular fluctuations. Omitting the stars of double maxima, the light appears to fall steadily from maximum to minimum with decreasing rapidity as complete minimum is approached, after which it undergoes a rapid increase to maximum. The measurements have often been made with considerable difficulty, so that large deviations from the smooth curves drawn through all the observations are common. These have been attributed for the most part to the various sources of accidental and systematic error which are incident to photographic work, when carried on by different telescopes, with

TABLE XXXV

MEAN LIGHT CURVES

Phase	Magn.	Res.	Phase	Magn.	Res.	Phase	Magn.	Res.	Phase	Magn.	Res.	Phase	Magn.	Res.
41			43			44			66			75		
d.			d.			d.			d.			d.		
0.022	14.21	4	0.007	14.67	0	0.025	14.72	8	0.017	14.71	1	0.010	14.75	3
0.052	14.38	7	0.021	14.66	4	0.047	14.89	6	0.037	14.75	3	0.048	14.79	2
0.069	14.62	6	0.034	14.77	4	0.070	14.85	4	0.062	14.70	3	0.060	14.78	0
0.078	14.69	4	0.052	14.85	9	0.098	15.02	4	0.093	14.81	0	0.093	14.85	1
0.088	14.71	1	0.068	14.82	2	0.131	15.06	5	0.146	15.00	4	0.134	14.94	1
0.109	14.90	3	0.086	14.75	10	0.142	15.17	3	0.170	14.99	5	0.149	14.95	1
0.139	15.07	0	0.107	14.94	4	0.161	15.15	0	0.213	15.13	0	0.164	14.94	6
0.155	15.19	0	0.124	15.05	9	0.196	15.05	0	0.238	15.15	2	0.195	15.01	5
0.166	15.23	3	0.148	14.93	8	0.221	14.81	0	0.268	15.04	1	0.218	15.28	17
0.188	15.40	2	0.185	15.06	3	0.246	14.69	1	0.296	14.85	5	0.240	15.14	1
0.202	15.49	5	0.216	15.17	2	0.264	14.66	0	0.332	14.77	1	0.264	15.11	6
0.229	15.57	4	0.236	15.16	3	0.284	14.74	7	0.364	14.73	2	0.289	15.25	7
0.258	15.48	11	0.271	15.31	7	0.299	14.61	10	0.395	14.72	2	0.316	15.14	7
0.276	15.68	6	0.299	15.24	3	0.318	14.91	8	0.412	14.68	5	0.353	15.13	11
0.295	15.47	6	0.335	15.30	0	0.343	14.96	3	0.434	14.74	5	0.385	15.32	5
0.312	15.84	19	0.376	15.31	3	0.355	15.05	0	0.443	14.97	16	0.420	15.20	8
0.325	15.73	8	0.404	15.36	0	0.371	15.10	1	0.465	14.81	6	0.447	15.43	13
0.351	15.67	2	0.452	15.43	3	0.399	15.10	5	0.483	14.95	2	0.494	15.26	4
0.366	15.58	6	0.477	15.40	1	0.417	15.20	5	0.525	15.00	5	0.532	15.29	0
0.401	15.53	3	0.509	15.42	3	0.436	15.10	2	0.554	15.14	1	0.573	15.23	0
0.437	15.31	7	0.548	15.23	1	0.447	15.19	9	0.604	15.16	3	0.606	15.14	2
0.478	14.18	3	0.613	14.78	1	0.454	15.05	2	0.644	14.95	2	0.635	15.08	1
..	..	..	0.640	14.68	0	0.470	14.93	8	0.676	14.82	1	0.671	14.90	2
..	..	..	..	..	..	0.488	14.93	3	..	..	..	..	..	..

Phase	Magn.	Res.	Phase	Magn.	Res.	Phase	Magn.	Res.	Phase	Magn.	Res.	Phase	Magn.	Res.
77 (1)			77 (2)			77 (3)			81			87		
d.			d.			d.			d.			d.		
0.014	14.59	1	0.030	14.49	1	0.030	14.44	2	0.018	14.59	0	0.020	14.85	2
0.049	14.55	6	0.062	14.51	2	0.062	14.52	2	0.063	14.64	3	0.049	14.82	0
0.072	14.64	1	0.095	14.60	2	0.095	14.54	3	0.076	14.74	1	0.080	14.84	1
0.103	14.73	6	0.140	14.65	2	0.140	14.70	3	0.110	14.96	2	0.114	14.97	9
0.145	14.76	4	0.155	14.70	4	0.155	14.74	4	0.142	15.13	2	0.141	14.95	2
0.192	14.67	10	0.183	14.67	2	0.183	14.77	0	0.172	15.23	0	0.164	15.10	14
0.245	14.85	2	0.215	14.73	1	0.217	14.82	0	0.206	15.26	6	0.183	14.96	2
0.283	14.90	2	0.242	14.73	4	0.255	14.87	1	0.222	15.35	0	0.235	15.15	11
0.303	14.98	8	0.262	14.78	3	0.303	15.00	3	0.238	15.38	0	0.293	15.11	0
0.329	14.81	12	0.310	14.93	6	0.347	15.01	2	0.259	15.45	4	0.334	15.08	8
0.366	14.94	3	0.344	14.95	3	0.394	15.09	2	0.278	15.34	10	0.371	15.14	5
0.409	15.02	0	0.386	14.96	0	0.428	15.19	3	0.299	15.44	4	0.389	15.16	5
0.444	15.08	3	0.417	15.03	3	0.463	15.18	2	0.330	15.62	11	0.399	15.27	5
0.477	15.03	5	0.444	15.00	3	0.499	15.28	3	0.346	15.59	7	0.415	15.17	6
0.509	15.12	0	0.490	15.08	1	0.523	15.29	1	0.372	15.53	0	0.444	15.23	4
0.544	15.13	2	0.511	15.13	2	0.562	15.27	5	0.397	15.43	11	0.469	15.26	2
0.566	15.24	8	0.541	15.09	4	0.618	15.42	2	0.434	15.59	3	0.506	15.33	1
0.601	15.09	7	0.580	15.18	1	0.664	15.46	1	0.465	15.55	2	0.560	15.27	0
0.635	15.09	7	0.644	15.23	2	0.699	15.46	1	0.483	15.57	0	0.580	15.21	1
0.688	15.16	9	0.678	15.30	4	0.750	15.05	2	0.503	15.48	0	0.625	15.09	0
0.723	14.83	4	0.713	15.14	0	0.780	14.93	1	0.522	15.05	0	0.672	14.95	0
0.764	14.61	13	0.766	14.85	0	0.822	14.74	1	0.536	14.74	4	0.710	14.89	1
0.794	14.78	13	0.786	14.74	3	..	..	..	..	..	..	0.724	14.85	2
0.829	14.59	1	0.826	14.67	4	..	..	..	..	..	..	..	..	..

various brands of plates, and by various observers. It has been found at the Harvard Observatory that under such conditions photographic results are liable to large, and sometimes unaccountable, discordances. That the light of all these variables changes in the uniform and regular manner indicated by the smooth curves drawn free-hand through the observations may readily be doubted. A series of measures by the most refined photometric or photo-electric methods, if this were possible, might settle the question. In the absence of such determinations, however, it seemed not improbable, that mean values, obtained by combining the observations of Table XXIII according to phase, might render evident any systematic fluctuations in the form of the light curve, if such really are present. Means of 5 observations were therefore taken of the following variables: — Nos. 41, 43, 44, 66, 75, 77, 81, and 87. The results of this grouping are given in Table XXXV, in which three columns are devoted to each star. The first of these columns contains the mean phase of the

observations, the second column, the mean magnitude, and the third column, the corresponding deviation from the smooth curve of the usual form drawn through the observations. In the case of No. 77, the results of three separate determinations are given, as explained below. It is evident that erratic and occasional irregularities would not be well shown by such a discussion, but only regularly recurring fluctuations. An examination of the light curves in Table XXXV and of the columns of residuals from the smooth curves appeared to give indications of such fluctuations, especially in the case of No. 77, which was selected for further study. Under 77 (1), are given the results derived from the original observations of Table XXIII, using the phases resulting from the period $0^d.847070$, which at the time this study was undertaken was regarded as the true one. A graphical representation of this mean curve is shown in Plate II, Fig. 1. From this curve it appears evident that

TABLE XXXVI

VARIABLE 77. SECONDARY PERIOD

Per. $0^d.847070$. Original Measures				Per. $0^d.845110$. Original Measures				Per. $0^d.845110$. Remeasures			
Phase	Res.	Means		Phase	Res.	Means		Phase	Res.	Means	
		Phase	Res.			Phase	Res.			Phase	Res.
d.		*d.*		*d.*		*d.*		*d.*		*d.*	
0.001	+ 2	..	..	0.009	0	..	..	0.005	+ 3	..	..
0.001	+ 8	0.002	+5	0.014	+ 4	0.013	+2	0.014	+ 4	0.013	+3
0.004	+ 4	..	..	0.017	+ 1	..	..	0.021	+ 3	..	..
0.014	+ 1	..	..	0.021	− 3	..	..	0.030	− 2	..	..
0.017	− 4	0.017	0	0.028	+ 6	0.026	+1	0.040	− 2	0.037	−1
0.020	+ 3	..	..	0.030	− 1	..	..	0.042	0	..	..
0.021	+ 8	..	..	0.042	− 2	..	..	0.046	− 2	..	..
0.036	− 7	0.035	−4	0.062	− 2	0.055	−1	0.055	+ 2	0.054	+1
0.047	−12	..	..	0.062	0	..	..	0.062	+ 2	..	..
0.049	− 6	..	..	0.062	+ 3	..	..	0.065	− 2	..	..
0.051	−10	0.051	−7	0.067	− 1	0.068	0	0.076	0	0.072	0
0.053	− 5	..	..	0.074	− 1	..	..	0.076	+ 3	..	..
0.058	−13	..	..	0.081	− 2	..	..	0.076	+ 1	..	..
0.070	− 7	0.067	−6	0.082	− 3	0.084	−1	0.095	− 3	0.090	0
0.072	+ 1	..	..	0.088	+ 2	..	..	0.100	+ 1	..	..
0.084	− 3	..	..	0.095	+ 2	..	..	0.101	+ 1	..	..
0.085	0	0.086	+3	0.101	− 4	0.100	−1	0.112	− 2	0.109	−1
0.088	+13	..	..	0.104	0	..	..	0.114	− 1	..	..
0.103	+ 6	..	..	0.115	+ 4	..	..	0.118	− 1	..	..
0.104	+ 2	0.109	+2	0.118	− 4	0.118	−1	0.136	+ 1	0.134	−1
0.120	− 2	..	..	0.121	− 3	..	..	0.139	− 5	..	..
0.123	+ 1	..	..	0.122	+ 4	..	..	0.140	+ 3	..	..
0.123	+ 9	0.124	+3	0.135	+ 3	0.132	+3				
0.127	0	..	..	0.140	+ 2	..	..				

at regularly recurring intervals of precisely one-sixth of the full period, $0^d.847070$, that is, at intervals of $0^d.141178$, beginning at about phase $0^d.05$, the star is brighter than is indicated by the smooth curve. This is well shown by discussing the residuals on the assumption of a secondary, superimposed period of $0^d.141178$. When these residuals are arranged by this period according to phase and then combined in mean groups of three, the results are given in the first four columns of Table XXXVI. This is shown graphically in Plate II, Fig. 8. So interesting was this outcome, and so accordant with results obtained elsewhere by other observers, that it seemed to be worth while to confirm the results by an independent determination of as great precision as possible. A special sequence of comparison stars near the variable was selected, and their magnitudes were determined by joining them to the stars of the original sequence. The results of this determination are given in Table XXXVII, in which the first column gives the designations of the stars of this special sequence. The second and third columns contain the rectangular coordinates from the centre of the cluster, expressed in seconds of arc. Direct determinations of magnitude by comparison with the stars of the original sequence were made, twice by Miss Woods and twice by the writer, and the results are given in the fourth and fifth columns. The means of the four determinations are given in the sixth column. The steps in grades were also estimated by the two observers and the mean values are given in the eighth column. These reduced to the scale of the magnitudes in the sixth column are given in the ninth column. The adopted magnitudes found in the tenth column are the means of the quantities given in the sixth and ninth

TABLE XXXVII

SPECIAL SEQUENCE FOR NO. 77

Des.	x	y	Magnitudes					Resids.	Gr.	Gr. Magn.	Adopt. Magn.
			W.		B.		Means				
	"	"									
a^2	−135.2	−227.7	14.30	14.30	13.85	14.0	14.11	19, 19, *26*, *11*	0.0	14.13	14.12
b^2	−280.1	−216.3	14.92	14.72	14.7	14.8	14.78	14, *06*, *08*, 02	4.2	14.75	14.76
c^2	−248.3	−181.2	15.16	15.16	15.1	15.3	15.18	*02*, *02*, *08*, 12	7.2	15.19	15.18
d^2	−326.2	− 47.1	15.78	15.78	15.6	15.6	15.69	09, 09, *09*, *09*	10.7	15.70	15.70
e^2	−205.3	−146.5	15.88	15.88	16.0	16.0	15.94	*06*, *06*, 06, 06	12.2	15.92	15.93

columns. Variable No. 77 was remeasured with the stars of this sequence by Miss Woods and the writer, and the results are given in Table XXXVIII. The measurements begin with J. D. 2413346. The first column contains the Julian date. The second, third, and fourth columns give respectively the determination of magnitude

TABLE XXXVIII

VARIABLE NO. 77. SECOND MEASUREMENTS

J. D.	W.	B.	Means	Res.	Per. $0^d.847070$		Per. $0^d.845110$		J. D.	W.	B.	Means	Res.	Per. $0^d.847070$		Per. $0^d.845110$	
					Phase	Res.	Phase	Res.						Phase	Res.	Phase	Res.
d.					*d.*		*d.*		*d.*					*d.*		*d.*	
3346.540	15.28	15.20	15.24	04, *04*	0.430	11	0.440	06	3717.692	15.28	15.30	15.29	*01*, 01	0.566	03	0.589	*07*
3366.544	14.76	14.65	14.70	06, *05*	0.105	*07*	0.161	*02*	" .817	..	15.20	15.20	A, ..	0.691	04	0.714	*14*
3369.698	14.90	14.80	14.85	05, *05*	0.718	*19*	0.780	*07*	3724.535	15.50	15.60	15.55	*05*, 05	0.632	29	0.671	10
3370.528	14.98	14.95	14.96	02, *01*	0.700	*16*	0.765	*03*	" .676	14.98	14.70	14.84	14, *14*	0.773	03	0.812	06
3371.529	14.56	14.55	14.56	00, *01*	0.007	*11*	0.076	04	3748.572	14.98	..	14.98	A, ..	0.104	21	0.200	19
3374.502	15.08	15.25	15.16	*08*, 09	0.439	02	0.513	*11*	3775.556	14.56	14.65	14.60	*04*, 05	0.829	*08*	0.140	*07*
" .538	..	R	..	..	0.475	..	..	..	3960.869	14.96	15.05	15.00	*04*, 05	0.634	*26*	0.374	*08*
3376.502	14.66	14.75	14.70	*04*, 05	0.745	*22*	0.823	*04*	4014.745	14.56	14.85	14.70	*14*, 15	0.297	*30*	0.163	*02*
" .543	14.46	14.45	14.46	00, *01*	0.786	*31*	0.019	01	4037.635	14.96	14.80	14.88	08, *08*	0.316	*14*	0.235	03
" .584	14.56	14.40	14.48	08, *08*	0.827	*20*	0.060	*01*	" .663	14.86	14.75	14.80	06, *05*	0.344	*24*	0.263	*10*
" .677	14.66	14.95	14.80	*14*, 15	0.073	06	0.153	10	4041.675	14.66	14.60	14.63	03, *03*	0.121	*16*	0.049	16
3377.578	14.66	14.75	14.70	*04*, 05	0.127	*10*	0.209	*11*	4052.600	14.70	14.70	14.70	00, 00	0.034	01	0.838	*01*
3378.579	14.98	15.20	15.09	*11*, 11	0.281	12	0.365	05	4058.548	14.66	14.30	14.48	18, *18*	0.053	*23*	0.020	03
3380.500	15.50	15.40	15.45	05, *05*	0.508	23	0.596	09	" .662	14.42	14.75	14.58	*16*, 17	0.167	*26*	0.134	*08*
" .602	15.80	15.55	15.68	12, *13*	0.610	42	0.698	23	" .780	15.22	14.80	15.01	21, *21*	0.285	03	0.252	13
3390.604	15.28	15.30	15.29	*01*, 01	0.447	13	0.558	*03*	" .854	14.86	15.05	14.96	*10*, 09	0.359	*10*	0.326	*05*
3408.568	15.28	15.15	15.22	06, *07*	0.622	*04*	0.775	21	4066.635	15.60	15.25	15.42	18, *17*	0.516	19	0.501	16
3409.544	14.32	14.45	14.38	*06*, 07	0.751	*50*	0.061	*12*	4067.636	15.38	15.35	15.36	02, *01*	0.670	15	0.657	*08*
" .623	14.86	14.65	14.76	10, *11*	0.830	08	0.140	09	4069.560	14.32	14.45	14.38	*06*, 07	0.053	*33*	0.046	*09*
3411.603	15.60	15.35	15.48	12, *13*	0.269	51	0.430	31	" .795	14.96	15.05	15.00	*04*, 05	0.288	02	0.281	07
3412.560	15.08	15.20	15.14	*06*, 06	0.379	06	0.541	*16*	4070.655	14.96	14.80	14.88	08, *08*	0.301	*12*	0.296	*08*
3413.569	15.48	15.40	15.44	04, *04*	0.541	18	0.705	02	4071.538	14.98	14.95	14.96	02, *01*	0.336	*08*	0.334	*06*
3414.620	14.56	14.50	14.53	03, *03*	0.745	*39*	0.066	03	" .747	15.50	15.45	15.48	02, *03*	0.546	23	0.543	18
3415.489	14.32	14.60	14.46	*14*, 14	0.767	*37*	0.090	*09*	4072.538	15.28	15.20	15.24	04, *04*	0.489	04	0.489	00
" .531	14.56	14.60	14.58	*02*, 02	0.809	*14*	0.132	*07*	" .745	15.38	15.50	15.44	*06*, 06	0.696	30	0.696	*02*
" .572	14.86	14.75	14.80	06, *05*	0.003	13	0.173	06	4073.553	15.40	15.50	15.45	*05*, 05	0.657	22	0.658	01
" .614	14.80	14.70	14.75	05, *05*	0.045	04	0.215	*07*	" .758	14.32	14.30	14.31	01, *01*	0.015	*37*	0.018	*14*
3419.548	14.98	14.95	14.96	02, *01*	0.590	*30*	0.769	*01*	4074.561	14.86	14.75	14.80	06, *05*	0.818	10	0.821	05
3422.494	14.86	14.95	14.90	*04*, 05	0.148	08	0.334	*12*	4085.663	14.56	14.55	14.56	00, *01*	0.061	*16*	0.092	00
" .591	15.08	15.20	15.14	*06*, 06	0.245	21	0.431	*03*	4086.608	14.66	14.85	14.76	*10*, 09	0.159	*08*	0.192	*02*
3423.506	15.28	15.20	15.24	04, *04*	0.313	22	0.501	*02*	4092.573	..	..	..	..	..	..	..	..
3666.649	14.86	14.90	14.88	*02*, 02	0.347	*17*	0.252	00	4093.532	..	..	..	..	..	..	..	..
3673.681	15.48	15.45	15.46	02, *01*	0.602	20	0.523	18	" .762	..	15.15	15.15	A, ..	0.537	*09*	0.585	*20*
3693.638	14.86	14.80	14.83	03, *03*	0.230	*09*	0.198	04	4133.607	15.28	15.50	15.39	*11*, 11	0.569	13	0.710	01
3694.577	..	15.05	15.05	A, ..	0.322	03	0.292	10	4147.519	..	..	..	..	..	..	..	..
" .615	15.08	15.10	15.09	*01*, 01	0.360	03	0.330	08	4437.629	15.28	15.10	15.19	09, *09*	0.493	*02*	0.492	*06*
3695.519	14.96	15.10	15.03	*07*, 07	0.417	*09*	0.389	*07*	4795.632	14.56	14.75	14.66	*10*, 09	0.186	*21*	0.168	*07*
" .561	15.08	15.25	15.16	*08*, 09	0.459	*01*	0.431	*01*	4846.568	15.08	15.05	15.06	02, *01*	0.297	07	0.398	*06*
" .602	14.90	15.15	15.02	*12*, 13	0.500	*19*	0.472	*20*	4860.582	14.56	14.55	14.56	00, *01*	0.758	*30*	0.045	09
" .644	15.60	15.60	15.60	00, 00	0.542	36	0.514	33	4876.513	14.86	14.95	14.90	*04*, 05	0.595	*36*	0.764	*09*
3698.504	14.86	14.70	14.78	08, *08*	0.013	10	0.838	07	4886.535	15.80	15.10	15.45	35, *35*	0.452	29	0.645	02
3699.499	14.86	14.75	14.80	06, *05*	0.161	*04*	0.143	13	5560.608	14.96	15.25	15.10	*14*, 15	0.257	15	0.320	10
" .542	14.80	14.85	14.82	*02*, 03	0.204	*06*	0.186	05	5562.605	15.60	15.30	15.45	15, *15*	0.560	19	0.627	04
" .584	14.86	14.75	14.80	06, *05*	0.246	*13*	0.228	*04*	5563.594	14.98	14.95	14.96	02, *01*	0.702	*16*	0.770	*01*
3713.513	15.38	15.30	15.34	04, *04*	0.622	08	0.635	*08*	5579.551	15.50	15.45	15.48	02, *03*	0.565	22	0.670	03
" .680	14.66	14.75	14.70	*04*, 05	0.789	*07*	0.802	*12*	5581.558	14.66	15.10	14.88	*22*, 22	0.031	19	0.142	21
3717.517	15.08	15.20	15.14	*06*, 06	0.391	04	0.414	*01*	5899.564	15.28	15.00	15.14	14, *14*	0.385	05	0.387	04

J. D.	W.	B.	Means	Res.	Per. $0^d.847070$		Per. $0^d.845110$		J. D.	W.	B.	Means	Res.	Per. $0^d.847070$		Per. $0^d.845110$	
					Phase	Res.	Phase	Res.						Phase	Res.	Phase	Res.
d.					*d.*		*d.*		*d.*					*d.*		*d.*	
5901.555	15.50	15.55	15.52	*02*, 03	0.682	34	0.687	06	9533.888	15.30	15.20	15.25	*05*, *05*	0.779	45	0.738	10
" .646	14.96	14.80	14.88	08, *08*	0.773	06	0.778	*05*	" .914	..	..	..	..	..	..	..	..
6633.655	14.32	14.40	14.36	*04*, 04	0.067	*36*	0.077	*16*	" .947	14.70	14.80	14.75	*05*, 05	0.838	08	0.797	*10*
6634.509	14.80	14.50	14.65	15, *15*	0.074	*09*	0.086	11	9537.761	15.00	15.10	15.05	*05*, 05	0.417	*07*	0.385	*04*
" .566	14.66	14.75	14.70	*04*, 05	0.131	*10*	0.143	03	" .786	15.28	15.10	15.19	09, *09*	0.442	04	0.410	06
" .682	14.86	14.75	14.80	06, *05*	0.247	*13*	0.259	*10*	" .812	15.28	15.30	15.29	*01*, 01	0.468	11	0.436	12
7021.639	14.46	14.75	14.60	*14*, 15	0.093	*16*	0.156	*11*	" .836	15.20	15.20	15.20	00, 00	0.492	00	0.460	00
7023.629	15.08	15.20	15.14	*06*, 06	0.389	05	0.455	*06*	" .874	15.40	15.25	15.32	08, *07*	0.530	08	0.498	07
" .678	15.38	15.35	15.36	02, *01*	0.438	22	0.504	10	" .899	15.28	15.10	15.19	09, *09*	0.555	*06*	0.523	*09*
8157.558	14.86	15.00	14.93	*07*, 07	0.091	17	0.247	06	" .924	15.28	15.20	15.24	04, *04*	0.580	*02*	0.548	*07*
9533.816	15.48	15.45	15.46	02, *01*	0.707	36	0.666	01	" .950	15.25	15.15	15.20	05, *05*	0.606	*06*	0.574	*14*

by Miss Woods, by the writer, and the mean. The fifth column gives the residuals of the two determinations from the mean. In 21 cases these exceed one tenth of a magnitude. A second set of measurements was made in all such cases, but on only four plates did the mean magnitude derived from the second measurements differ by more than one tenth of a magnitude from the mean of the first measures. These differences are for J. D. 3380.602, −0.18; 4066.635, −0.12; 4014.745, +0.15; and 5581.558, −0.28, obtained by subtracting the second value from the first. The mean difference of all is ±0.07. In nearly all cases, where these large residuals occur, the images are poor and faint. In such cases differences of one or two tenths of a magnitude will probably occasionally occur even when the greatest care is used. The phases of the observations, derived from the use of the period $0^d.847070$, are given in the sixth column, and the corresponding residuals from the smooth curve, in the seventh column. These results confirm in a general way those obtained from the original observations, but the secondary period is less well marked. This feature, if genuine, should have been more clearly brought out by the remeasurements. In searching for an explanation, a re-examination was made of the period employed, $0^d.847070$, which is the longest of any star in the cluster, less than one day. The period was found to be slightly in error. The clusters were photographed in general at about the same time each year, when they were near opposition to the Sun. Most of the observations of a variable occur, therefore, in groups at intervals of about a year, and a small error in the period, involving one or two returns of maximum too many or too few in one year, does not cause large discordances in many cases. For No. 77, it was found that $0^d.845110$ fitted the observations much better than the original period used, and a careful test of other periods, both a little larger and a little smaller, made it evident that this is the correct period. The original

observations were then plotted with the new period and the mean results, found by combining the observations in groups of 5 according to phase, are given under 77 (2) in Table XXXV, and a graphical representation, in Plate II, Fig. 3. The results obtained by the use of the new period with the magnitudes derived from the measurements are given in the eighth and ninth columns of Table XXXVIII, and the mean results, in Table XXXV, under 77 (3). In Table XXXVI, the fifth to the eighth columns give the secondary curve derived from the new period and the original measures, and the ninth to the twelfth columns, the secondary curve obtained from the new period and the later measurements. The latter is shown in Plate II, Fig. 10. By reference to Figs. 8 and 10, it is seen that a nearly smooth curve with a well marked variation, is obtained when the erroneous period is employed, which is to some extent verified by the second measures. With the use of the correct period, however, the variations become so small that they may well be attributed to accidental errors. In the former case, the mean results give a well marked range of a tenth of a magnitude, but, with the use of the correct period, this is reduced to about three hundredths of a magnitude, or less. The conclusion seems to be inevitable that the apparent secondary variation of one sixth the full period was due, not to some cause inherent in the star, but to some harmonic relation between the whole period and the contained error. It is evident that caution should be used in accepting such appearances as genuine.

The writer, in conclusion, wishes to express his high appreciation of the assistance rendered during this discussion by Miss H. S. Leavitt, Miss E. F. Leland, Miss I. E. Woods, and by the Director of the Observatory, Professor E. C. Pickering.

DESCRIPTION OF THE PLATES

PLATE I. FIGURE 1. The cluster Messier 5. This chart is a reproduction of that in H.A. 38, Plate VIII, Figure 2. The scale is $10' = 0.1$ cm. The original negative, X 6805, had an exposure of 75^m, on June 29, 1895. The variables 10, 22, 66, 67, 68, 69, 70, 73, and 75, and the comparison stars a and d are outside the limits of the plate.

FIGURE 2. Mean light curve of 10 selected stars of shortest period. See page 164.

FIGURE 3. Mean light curve of 10 selected stars of medium period. See page 164.

FIGURE 4. Mean light curve of 10 selected stars of longest period. See page 164.

FIGURE 5. Mean light curve of all the 30 stars. See page 164.

FIGURE 6. Mean light curve of all the 30 stars on the Mount Wilson plates. See page 164.

FIGURE 7. The periods of the variables. See page 155.

PLATE II. FIGURE 1. Mean light curve of No. 77, from the original measurements and period. See page 186.

FIGURE 2. No. 62. Simple period. See page 177.

FIGURE 3. Mean light curve of No. 77, from the remeasurements and the corrected period.

FIGURE 4. No. 62. Corrected period.

FIGURE 5. Light curve formed by the combination of two variables of cluster type, with alternating maxima. See page 184.

FIGURE 6. Resolution of No. 62 into two stars. See page 184.

FIGURE 7. Resolution of the mean light curve of 7 variables having double maxima into two stars. See page 184.

FIGURE 8. No. 77. Apparent secondary light curve. See page 188.

FIGURE 9. No. 62. Secular variation of period. See page 180.

FIGURE 10. No. 77. Revised secondary light curve. See page 188.

END OF VOLUME 78, PART 2

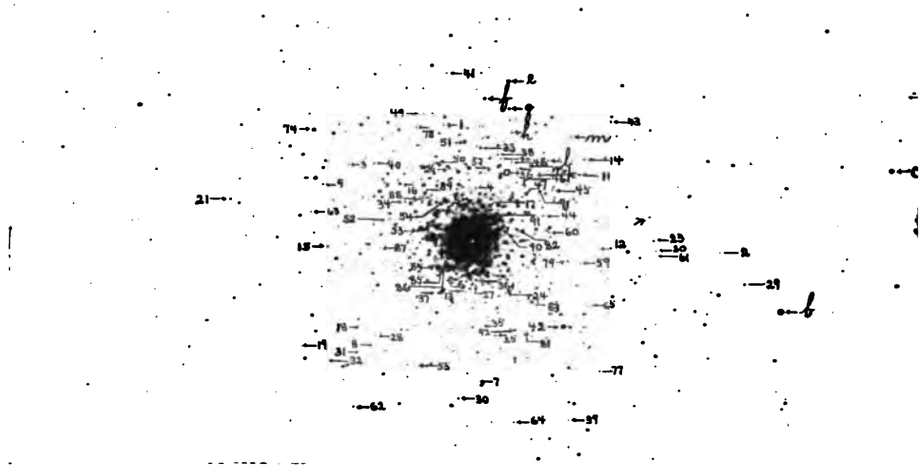


FIG. 1. THE CLUSTER MESSIER 5.

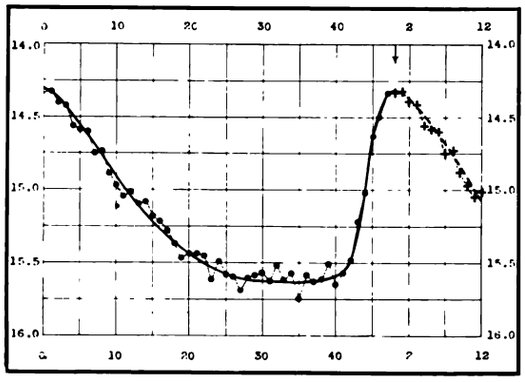


FIG. 2. MEAN LIGHT CURVE. GROUP 1.

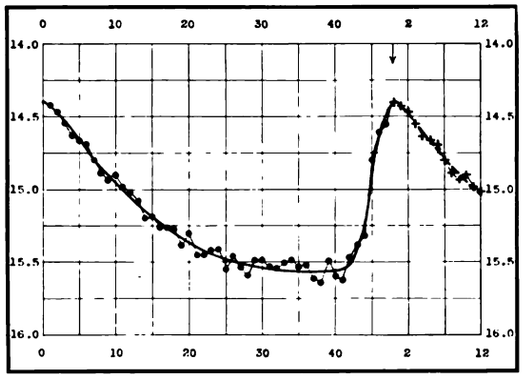


FIG. 3. MEAN LIGHT CURVE. GROUP 2.

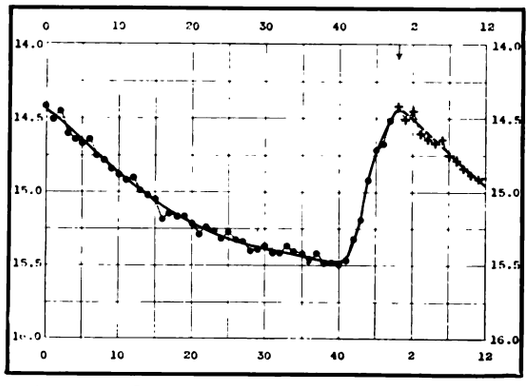


FIG. 4. MEAN LIGHT CURVE. GROUP 3.

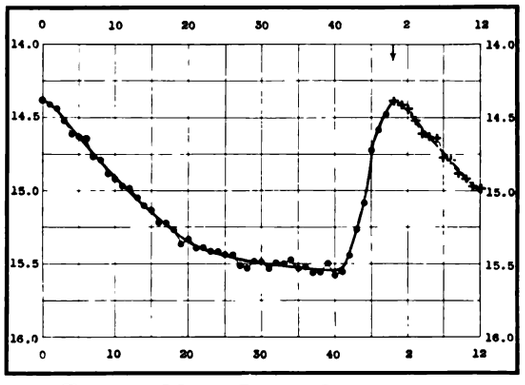


FIG. 5. MEAN LIGHT CURVE. ALL.

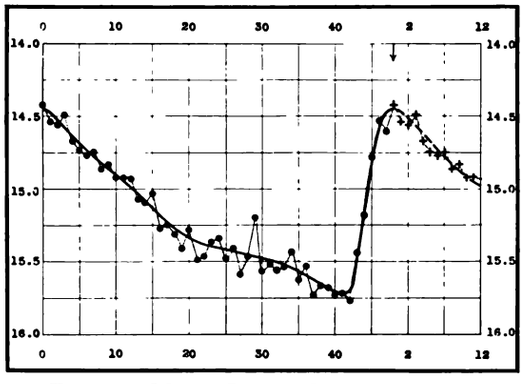


FIG. 6. MEAN LIGHT CURVE. M. W.

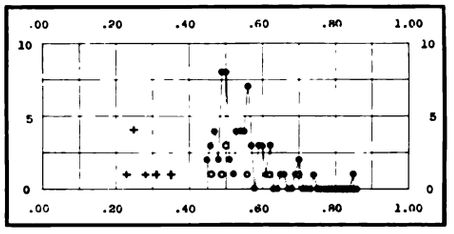


FIG. 7. PERIODS.

MESSIER 5. CLUSTER LIGHT CURVES. PERIODS.

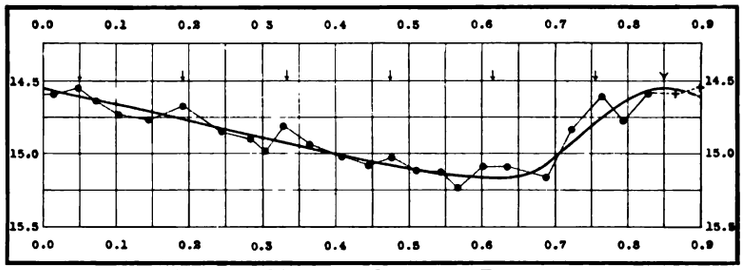


FIG 1. NO. 77. ORIGINAL RESULTS.

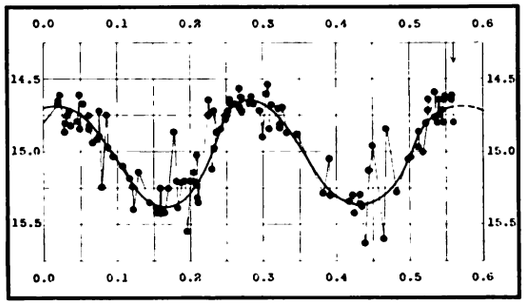


FIG. 2. NO. 62. SIMPLE PERIOD.

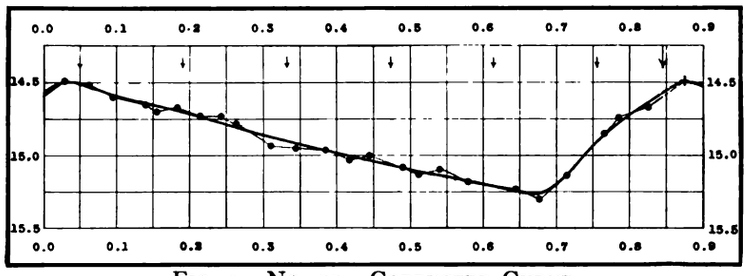


FIG. 3. NO. 77. CORRECTED CURVE.

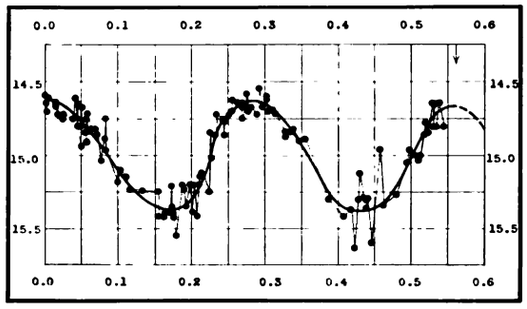


FIG. 4. NO. 62. CORRECTED PERIOD.

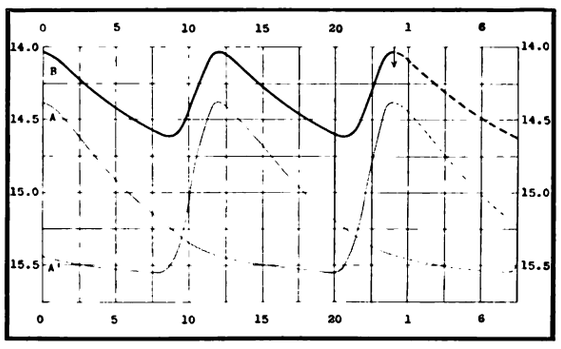


FIG. 5. COMPOSITE LIGHT CURVE.

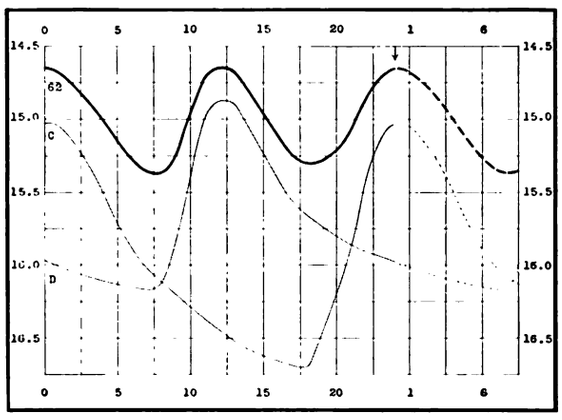


FIG. 6. NO. 62. RESOLVED LIGHT CURVES.

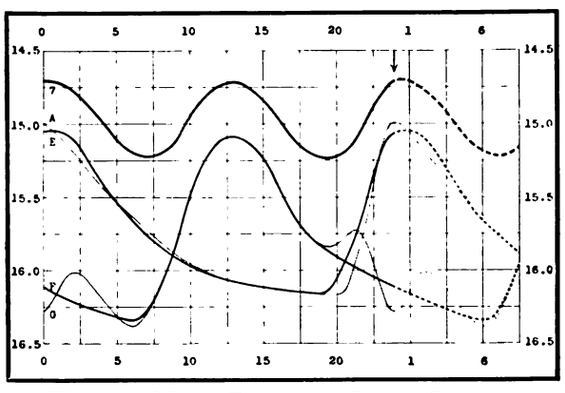


FIG. 7. MEAN RESOLVED LIGHT CURVES.

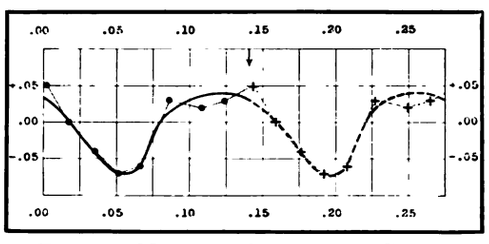


FIG. 8. NO. 77. SECONDARY CURVE.

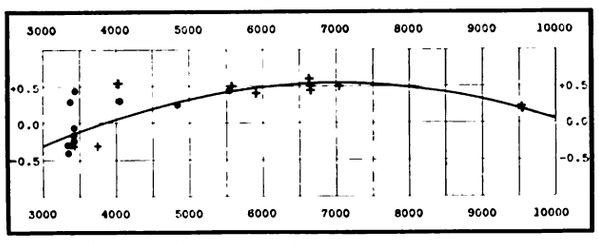


FIG. 9. NO. 62. SECULAR VARIATION.

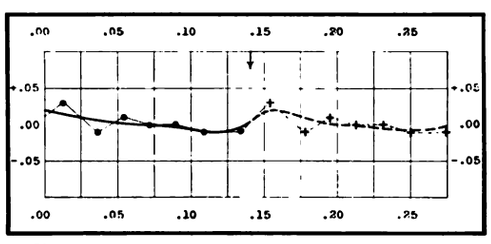
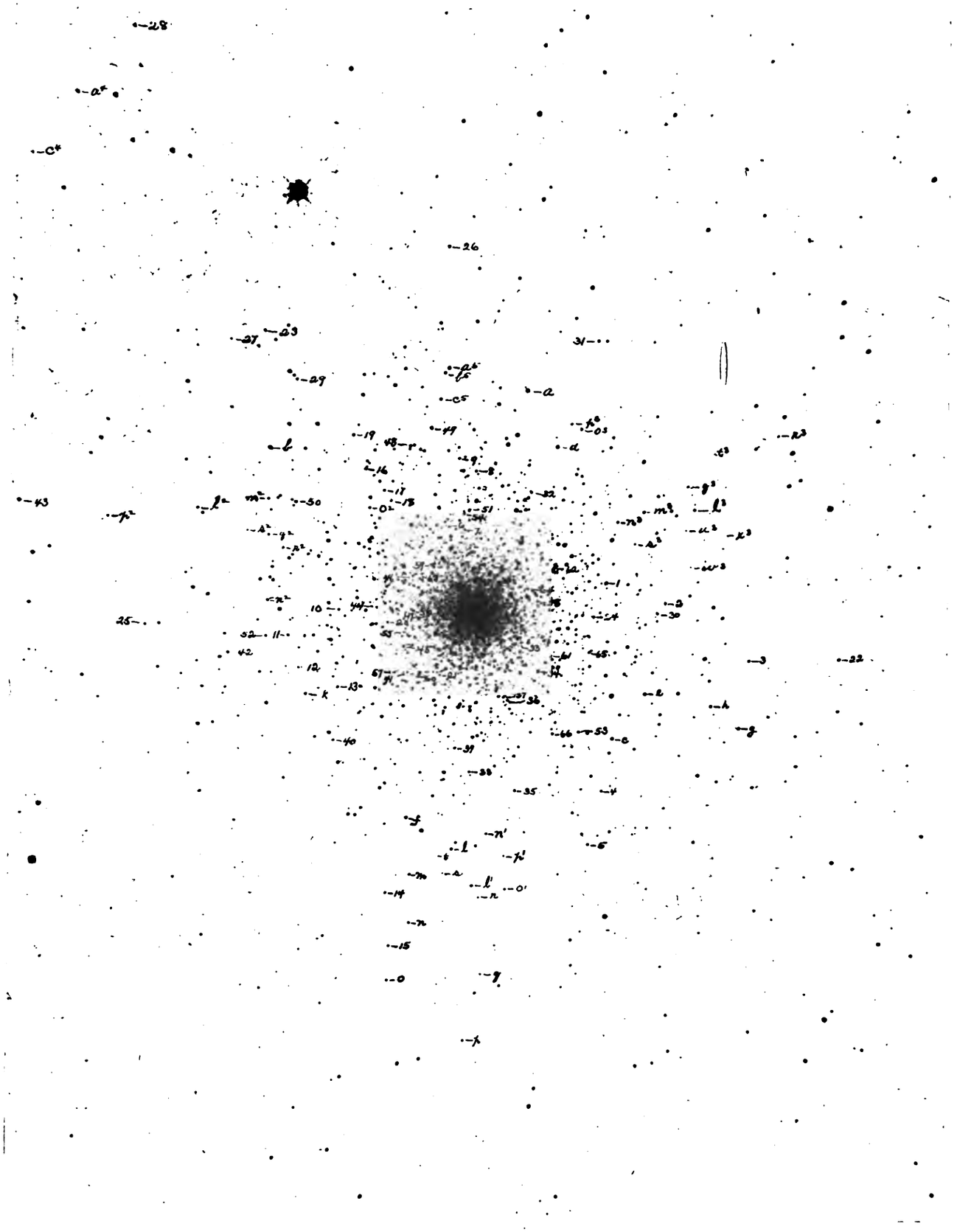


FIG. 10. NO. 77. SECONDARY CURVE.

MESSIER 5. LIGHT CURVES OF VARIABLES.



THE CLUSTER MESSIER 15.

60-INCH MOUNT WILSON REFLECTOR.

ANNALS

OF

THE ASTRONOMICAL OBSERVATORY OF HARVARD COLLEGE

EDWARD C. PICKERING, DIRECTOR

VOLUME 78, PART 3

VARIABLE STARS

IN THE

CLUSTER MESSIER 15

BY

SOLON I. BAILEY

PHILLIPS PROFESSOR OF ASTRONOMY

ASSISTED BY

EVA F. LELAND AND IDA E. WOODS

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VARIABLE STARS IN THE CLUSTER MESSIER 15

CHAPTER IX

SEQUENCES OF COMPARISON STARS

MESSIER 15, N. G. C. 7078, is a condensed globular cluster similar in form and structure to Messier 3 and Messier 5. Its approximate position for 1900 is $21^h\,25^m\,9^s$, $+11°\,43'.7$. Sir William Herschel estimated its diameter as $4'$. Sir John Herschel also observed this object, as "a magnificent globular cluster." The central condensation of the stars appeared to him so marked as to be compared to a "protuberance or nipple." The descriptions of these distinguished astronomers illustrate how difficult such objects are for visual observation. Few results of great precision could be expected before the use of photography, except with instruments of the greatest size. The diameter of Messier 15, as determined by the count given in H.A. **76**, 68, is $25'$. This count included little more than a thousand stars, whose distribution is shown in Table V, page 75, of the above publication, to be nearly globular, but somewhat irregular. Few, if any, of the clusters called globular are precisely globular in form. Minor irregularities nearly always occur, at least among the brighter stars. ω Centauri is distinctly elliptical, as stated in H.A. **38**, 5, and N. G. C. 6266 is extremely flattened on one side, as described in H.A. **76**, 74. Recently, Pease and Shapley have made an elaborate study of the distribution of the stars in a number of globular clusters, in order especially to test "for the presence in these stellar systems of galactic planes, which should reveal themselves through an elliptical distribution of the stars." See Contributions from the Mount Wilson Solar Observatory, No. 129. In the case of Messier 15, counts were made on ten plates, having exposures ranging from 1^m to 312^m. On the plates of short exposure, the distribution presents irregularities varying with the exposure, but does not appear to show any axis of symmetry. On Plate 25, however, having an exposure of 312^m, and showing 29,000 stars, the cluster has a well-marked elliptical form. In general, the authors state that, "Axes of symmetry in these clusters do not appear until the arrangement of several thousand stars is analyzed."

In this cluster 51 variables were found at Arequipa, in 1895, from an examination of photographs made with the 13-inch Boyden Telescope. In general, these photographs had exposures of about 100^m, and showed somewhat more than 1000 stars, of which about 900 were sufficiently well separated to permit an examination for the detection of variables. The study of these variables has been much delayed. While it was in progress, an examination of the variables on a series of photographs made with the 60-inch Reflector on Mount Wilson was planned by Dr. Harlow Shapley. To prevent duplication, he generously sent his photographs to Cambridge for measurement and inclusion in the discussion of the Harvard photographs. Altogether, about 150 photographs were available. In order to avoid unnecessary labor and expense in measurement and publication, this number of plates was cut down to 75, which has been found sufficient for a satisfactory determination of the elements of variable stars. The Mount Wilson plates were of superior quality and grouped in convenient series. They were nearly all retained, therefore, but only the best and most favorably situated plates taken with the 13-inch Boyden Telescope at Arequipa and the 24-inch Reflector at Cambridge were used. The selected series of 75 photographs extends from July, 1896, to November, 1916, an interval of over twenty years. During the measurement of the variables 15 new variables were discovered, making the whole number included in the present discussion 66. Those found at Arequipa were numbered 1 to 51, and the new ones, 52 to 66. Of the latter, Nos. 52, 55, 56, 57, 60, and 66 were discovered by Miss E. F. Leland and Nos. 53, 54, 58, 59, 61, 62, 63, 64, and 65, by Miss I. E. Woods.

All the variables found belong to the thousand brighter stars of the cluster. In general, they range in brightness from a little below the fifteenth to a little below the sixteenth magnitude. As to the variability of the vast number of fainter stars, which are present in the cluster but which are too faint to be well shown on the plates used in this discussion, nothing is at present known.

A sequence of comparison stars for the variables in Messier 15 was given in H.A. **38**, 243, and a chart of the cluster showing these stars, in Fig. 2, Plate XII, of the same volume. Later, it became necessary to add other sequences of comparison stars. The determination of the photographic magnitudes of all these comparison stars has been made by Miss Leavitt whose discussion of her results follows.

The basis of the scale of magnitudes is a comparison with the North Polar Sequence by means of three plates taken in series, on as many different nights. The faintest star measurable was 1, magnitude 15.3, and this was seen only on one plate. As stars brighter than 1 are seldom needed in observing the variables, it was necessary to extrapolate for practically the entire range of magnitudes employed. Two

methods were used for this purpose, namely, the diffraction grating on the 24-inch Reflector, and a comparison of exposures of different lengths on ten plates taken with the 60-inch Mount Wilson Reflector. By means of the grating, the scale was extended to star 0, magnitude 16.0, although as the plates were not satisfactory the results were regarded as somewhat uncertain. In deriving a scale from the Mount Wilson plates, four plates having exposures of 12^m, 15^m, 15^m, and 20^m, respectively, were measured and compared with six having exposures of 3^m or 4^m each. Curves which may be designated *a* were drawn, having as their coordinates the scale readings and the differences found by subtracting these from the magnitudes depending on series plates through star l. The differences were read off from the smooth curve *a* for every half unit of the scale and the resulting quantities for the four plates of longer exposures were subtracted in turn from those corresponding to the same readings on the six plates of short exposures. If the curves were parallel, the differences would be constant for each pair of plates, whatever the scale reading. The magnitudes of faint stars could then have been determined by correcting the readings on long exposure plates by means of the curves, *a*, drawn for those of shorter exposure, and adding the observed constant. Owing to differences in the gradation of the plates, however, the curves are not parallel. The differences for each pair of plates, therefore, were plotted against the corresponding readings, and the resulting curves, *b*, were extended, assuming that the rate of divergence remained constant. After correcting the readings of the faint stars on the four long exposure plates by means of curves, *a*, drawn for those of short exposure, the results for each pair of plates were further corrected from the corresponding curves, *b*. In this way six scales of magnitude were obtained for each plate of long exposure, or twenty-four in all, through star p, magnitude 16.4. The average deviation from the mean derived on the six plates of short exposure for stars l to p, inclusive, was ± 0.084 magn. The average deviation of the means thus derived for each of the plates of long exposure from the mean of the four was ± 0.140 magn. A second extrapolation was necessary to carry the scale down to star t, but the fainter stars were not used for observing the variables.

The material employed for determining the magnitudes of the comparison stars may be summarized as follows: —

(1) Comparisons with the North Polar Sequence on three plates taken in series on different nights, using the 16-inch Metcalf Telescope. Through star l, magn. 15.3. The magnitudes thus derived formed the basis of the remaining determinations.

(2) Magnitudes derived from three plates taken with the grating on the 24-inch Reflector. Through star 0, magn. 16.0.

(3) Magnitudes derived from four Mount Wilson plates of longer exposures, compared with six of shorter exposures. Through star t, provisional magn. 17.9.

(4) Measures on six Mount Wilson plates of shorter exposures, reduced graphically to a scale formed by taking the mean of (1), (2), and (3).

(5) Estimates of intervals between successive comparison stars on four plates taken with the 13-inch Boyden Telescope and reduced in the same way as (4).

(6) Estimates, by a different observer, of intervals on four Mount Wilson plates, reduced in the same way as (4) and (5).

The adopted magnitudes were obtained by taking the mean of the six methods. The accidental errors are very small, on account of the large number of plates employed, but the scale was felt to be rather uncertain, owing to the extended extrapolation. Fortunately, it has now been confirmed from an independent source. While the observation of the variables was in progress, Dr. Harlow Shapley kindly sent magnitudes obtained by direct comparison with the North Polar Sequence on Mount Wilson plates. It is found that the two scales are nearly the same, after allowing for the systematic difference known to exist between the Harvard and Mount Wilson magnitudes, as will be shown below. The inclusion of the magnitudes sent by Dr. Shapley would have made no appreciable difference in the results for the variables, and as the observations were nearly finished, no changes were made.

In Table XXXIX, the designation and the coordinates in x and y, as given in the first three columns, are taken from H.A. **38**, Table XXIV, page 243, for stars not having the number 1 attached. The latter were added to the original sequence, for greater convenience in observing the variables, and the positions are referred to the same system. The faint stars, r, s, and t, have also been added. A star whose coordinates in x and y are $+20''.0$ and $-210''.8$, respectively, magnitude 15.63, was not needed in the discussion and has been omitted from the table. The fourth and fifth columns give the magnitude (1), derived from series plates, and the corresponding residuals. The adopted magnitude is given in the sixth column, and is followed in the seventh column by the residuals from the six magnitudes enumerated on page 201. The eighth column gives the difference found by subtracting the adopted magnitude from that sent by Dr. Shapley. After taking out the constant difference, +0.28 magn., the average difference is ±0.093 magn. Dr. Shapley states that the magnitude for star q is uncertain. Omitting this, the constant becomes +0.30, and the average difference ±0.084. A fairer comparison may be made by applying the known difference between the Harvard and Mount Wilson scales, depending on the magnitudes of the North Polar Sequence, as given in H.A. **71**, No. 3, page 231, and in the Mount Wilson Contributions No. **98**, Table II, Column 2. After subtracting these corrections from the observed differences in

the eighth column, there remains a constant difference of +0.05 magn., which is, perhaps, not surprising, considering that the number of plates used for comparison with the Pole is not large. The last column gives the corrected differences of Dr. Shapley's magnitudes from those adopted. In order to recover the values applied for the systematic difference between Harvard and Mount Wilson, the quantities in

TABLE XXXIX

COMPARISON STARS

Des.	x	y	Prelim. Ptg.	Residuals.	Ptg.	Residuals.	Diff. W.—H.	Corr. Diff.
	″	″						
a	− 47.5	+200.4	13.69	18,11,*29*	13.69	A,..,..,..,..,..	+0.45	+0.14
b	+187.1	+149.6	14.18	06,02,*09*	14.18	A,..,..,..,..,..	+0.33	+0.02
c	−122.6	−116.7	14.34	23,*09*,*13*	14.34	A,..,..,..,..,..	+0.24	−.007
d	− 74.2	+149.2	14.39	14,*09*,*06*	14.39	A,..,..,..,..,..	+0.42	+0.12
e	−153.1	− 76.3	14.51	28,*16*,*11*	14.51	A,..,..,..,..,..	+0.25	−0.05
f	+ 65.0	−187.6	14.57	18,*07*,*11*	14.57	A,..,..,..,..,..	+0.41	+0.11
g	−238.2	−108.4	14.80	08,*10*,03	14.89	*09*,*10*,..,01,08,12	+0.12	−0.18
h	−213.1	− 88.2	15.18	*04*,*08*,13	15.09	09,01,*12*,*07*,00,10	+0.14	−0.15
k	+156.6	− 74.8	15.26	..,*16*,17	15.22	04,*03*,*03*,03,*07*,08	+0.27	−0.01
l	+ 24.4	−216.4	15.43	..,..,A	15.31	12,*09*,08,06,03,*06*	+0.37	+0.10
l¹	+ 5.4	−249.0	..	..,..,..	15.54	..,..,00,05,*04*,*01*	..	..
n	+ 63.4	−282.8	..	..,..,..	15.64	..,*06*,00,04,02,*02*	+0.38	+0.13
n¹	− 8.1	−202.4	..	..,..,..	15.65	..,..,11,04,*08*,*07*	..	..
m	+ 62.7	−239.0	..	..,..,..	15.69	..,*03*,00,00,*04*,07	+0.28	+0.03
o	+ 83.6	−335.6	..	..,..,..	16.01	..,*02*,*03*,*01*,00,06	+0.26	+0.03
o¹	− 24.0	−253.2	..	..,..,..	16.16	..,..,*03*,*02*,05,*07*	..	..
p	+ 15.0	−389.9	..	..,..,..	16.41	..,..,*03*,01,*07*,10	+0.23	+0.03
p¹	− 24.0	−222.8	..	..,..,..	16.73	..,..,00,*04*,13,*10*	..	..
q	− 4.	−329.	..	..,..,..	16.93	..,..,*03*,*03*,*03*,04	−0.02	−0.19
r	− 0.8	−260.0	..	..,..,..	17.28	..,..,00,01,04,*05*	..	..
s	+ 32.3	−238.8	..	..,..,..	17.64	..,..,00,00,04,*04*	..	..
t	+ 39.5	−223.1	..	..,..,..	17.87	..,..,*01*,*02*,*05*,07	..	..

the last column should be changed by +0.05 and then subtracted from those in the eighth column. The average value of the corrected differences is ±0.091, and they appear to have no systematic character. Omitting star q, for which Dr. Shapley's magnitude is doubtful, the constant becomes +0.06, and the average difference +0.077. This agreement may be considered to be very satisfactory.

Many of the variables are too far from the sequence for convenient observation, and two additional sequences were selected. They were measured on eight plates, four taken with the 13-inch Boyden Telescope, and four with the 60-inch Mount

Wilson Reflector. The principal sequence was measured also on each plate. For Sequence 2, the intervals between the successive comparison stars were also estimated in grades. All the measures were reduced graphically to the scale of the principal sequence. In Table XL, the successive columns give the designation, the coordinates in x and y, the mean of the magnitudes derived from the different sets of observations, and the corresponding residuals. The stars are distinguished from those of the principal sequence, by attaching the numbers 2 or 3 to the letters as given in the first column.

TABLE XL

ADDITIONAL SEQUENCES

Des.	x	y	Magn.	Resid.	Des.	x	y	Magn.	Resid.
	″	″				″	″		
l^2	+254.6	+ 95.0	15.61	02,00,*01*	l^3	−199.8	+ 91.8	15.45	*01*,01
m^2	+189.0	+103.1	15.77	00,00,*01*	m^3	−153.4	+ 89.5	15.57	*01*,01
n^2	+190.6	+ 10.4	15.85	*03*,02,02	n^3	−129.6	+ 81.0	15.86	*04*,03
o^2	+ 97.2	+ 94.6	16.07	*01*,01,00	o^3	− 96.8	+165.8	16.02	*04*,04
p^2	+336.8	+ 87.6	16.23	04,02,*06*	p^3	− 88.1	+170.6	16.36	*08*,07
q^2	+188.9	+ 69.8	16.50	04,*03*,00	q^3	−194.6	+112.7	16.55	*09*,09
r^2	+176.6	+ 59.5	16.75	*03*,02,05	r^3	−276.8	+158.2	16.74	*05*,04
s^2	+210.5	+ 74.3	17.28	*01*,00,01	s^3	−143.2	+ 60.8	17.00	*08*,08
t^2	+279.2	+184.3	18.01	03,*03*,00	t^3	−216.2	+144.0	17.14	*11*,11
					u^3	−189.9	+ 73.6	17.43	00,00
					w^3	−194.2	+ 38.8	17.91	06,*06*

Stars in the three sequences which are fainter than p, magnitude 16.4, were not needed in observing the variables. Owing to the fact that a method of approximation was used, they are subject to errors of scale which may be large for those fainter than the seventeenth magnitude. The accidental errors are small, however, and the magnitudes can be reduced easily to a definitive scale, whenever one is established. As they would be useful for observing fainter variables, if any should be discovered, and for statistical studies, they are included in the tables. Stars m, n, and o were used but little, the first, because a faint companion is so close that the images are usually superposed, the other two, because they are more distant from the centre than other comparison stars of about the same brightness.

Variable 28 is so far from the centre of the cluster that a special sequence was selected. The three stars a^4, b^4, and c^4, have their coordinates in x, +362″.6, +253″.2, and +405″.2, respectively, and in y, +476″.6, +583″.5, and +421″.2, respectively. They were measured at the same time with suitable stars in the prin-

cipal sequence, using four plates taken with the 13-inch Boyden Telescope, on which the corrections for distance are comparatively small. The means of the resulting magnitudes were, for a^4, 15.17, for b^4, 15.92, and for c^4, 16.14, which were adopted. The average deviation for the four plates is ± 0.062 magn.

The results for Variable 49 were also unsatisfactory when the star was compared with the stars of either of the foregoing sequences. Three additional stars, called a^5, b^5, and c^5 were therefore selected near the variable. The corresponding magnitudes are 14.99, 15.44, and 15.72, respectively, and their positions in x, $+23''.9$, $+27''.8$, and $+32''.5$, and in y, $+221''.8$, $+217''.6$, and $+193''.4$.

CHAPTER X

OBSERVATIONS OF THE VARIABLES IN MESSIER 15

THE measurements of brightness of the variables in Messier 15 have been made by Miss Leland and Miss Woods. They found it impossible to obtain satisfactory measurements of variables distant from the comparison stars employed, and other comparison stars, in different parts of the cluster, were added to the original sequence given in H.A. 38. This has greatly improved the results. Indeed, the selection of the nearest stars of constant brightness for the measurement of each variable would no doubt give more accordant results in the majority of cases than those now obtained. The great amount of work, which the use of such large numbers of stars as standards of magnitude would involve, has prevented the execution of this plan at the present time. Moreover, while the results thus obtained would have been more accordant, they would seldom have differed materially from those actually found. See H.A. 38, Chapter V. All the variables were measured independently by each observer, and the magnitudes given in Tables XLII and XLIII are the means of the two determinations. Both measures of 5 and 14, however, were made by Miss Leland. The residuals from the individual measures are not given in the table, but a discussion of them will be found on page 227. Whenever these residuals were 0.5 magn., or greater, the star was remeasured by both observers and the results are given in Table XLIV. No remeasurements have been made on account of discordances from the mean light curve, when the two observers were in agreement. In such cases, however, the image of the star has been carefully examined with a high power. If the image was found to be perfect, the results were allowed to remain, but if defective, the results were rejected.

The early photographs used in the discussion belong to the X series and were made at Arequipa with the 13-inch Boyden Telescope during the years 1896 to 1908. An exposure of 100^m was in general necessary to show the variables well at minimum. The excellent plates made with the 60-inch Reflector on Mount Wilson are here designated by the letters MW. They include two long series on the successive days, August 14 and 15, 1915, and exposures on two nights in 1916. These series of plates served admirably for the determination of the approximate periods. To bring the discussion down to as late a date as possible, a series of photographs was

TABLE XLI

DESCRIPTION OF PLATES

Plate	Date	J. D.	Ex.	Quality	Plate	Date	J. D.	Ex.	Quality
	y. m. d.	d.	m.			y. m. d.	d.	m.	
X 7767	96 7 29	3770.633	120	3	MW 2620	15 8 15	0725.852	5	4
X 7985	" 9 12	3815.548	120	3.5	MW 2621	" " "	" .857	4	4.5
X 7986	" " "	" .635	120	3.5	MW 2623	" " "	" .916	5	4.5
X 8014	" " 30	3833.554	167	3	MW 2624	" " "	" .926	15	4.5
X 8664	97 6 10	4086.763	110	3	MW 2626	" " "	" .937	5	4.5
X 8780	" 8 3	4140.634	120	3.5	MW 2628	" " "	" .967	4	3.5
X 8869	" 10 2	4200.535	110	4.5	MW 2629	" " "	" .972	5	3.5
X 8912	" " 12	4210.527	120	4	MW 2631	" " "	" .981	8	4
X 8920	" " 14	4212.581	123	4	MW 2632	" " "	" .994	19	3
X 10893	04 10 7	6761.629	105	3	MW 3394	16 8 23	1099.717	25	4
X 10897	" " 13	6767.536	110	3	MW 3395	" " "	" .737	25	4
X 12162	08 8 29	8183.646	120	3	MW 3396	" " "	" .772	14	5
MW 2580	15 8 14	0724.652	5	4	MW 3401	" " "	" .917	20	4
MW 2582	" " "	" .669	4	4	MW 3428	" 9 6	1113.627	5	4
MW 2584	" " "	" .699	4	4	MW 3429	" " "	" .636	8	5
MW 2585	" " "	" .703	4	4	MW 3432	" " "	" .683	9	5
MW 2587	" " "	" .733	3	3.5	MW 3434	" " "	" .721	5	5
MW 2588	" " "	" .738	4	4	MW 3437	" " "	" .763	8	5
MW 2590	" " "	" .764	4	3	MW 3439	" " "	" .775	5	5
MW 2592	" " "	" .794	4	4	MW 3441	" " "	" .811	5	4
MW 2593	" " "	" .798	5	4.5	MW 3444	" " "	" .897	5	4
MW 2595	" " "	" .825	4	5	MW 3446	" " "	" .921	6	4
MW 2596	" " "	" .839	5	4	MW 3447	" " "	" .930	10	4
MW 2597	" " "	" .856	5	3.5	H 1715	" " 21	1128.623	60	3
MW 2598	" " "	" .862	3	3	H 1716	" " 25	1132.533	45	3.5
MW 2600	" " "	" .894	5	4.5	H 1719	" " "	" .660	50	3.5
MW 2602	" " "	" .911	5	5	H 1720	" " 26	1133.533	45	3.5
MW 2604	" " "	" .946	5	4.5	H 1722	" " "	" .612	48	3
MW 2606	" " "	" .982	5	4	H 1724	" " 28	1135.582	45	3
MW 2607	" " "	" .987	5	4	H 1725	" " "	" .618	46	3.5
MW 2608	" " 15	0725.653	5	4	H 1726	" " 30	1137.574	48	3
MW 2610	" " "	" .677	5	4	H 1728	" 10 2	1139.618	45	2.5
MW 2612	" " "	" .711	5	4	H 1732	" " 26	1163.490	62	3
MW 2613	" " "	" .721	15	4	H 1733	" " "	" .548	60	3
MW 2614	" " "	" .729	4	4	H 1737	" " 27	1164.471	40	3
MW 2616	" " "	" .792	5	4.5	H 1745	" 11 16	1184.501	52	3
MW 2618	" " "	" .812	4	4	H 1746	" " "	" .540	52	3.5
MW 2619	" " "	" .821	12	5					

made during the latter part of 1916 at Cambridge, with the 24-inch Reflector. This series is designated by the letter H. Conditions in Cambridge are not favorable for

photographs of this nature. The observers have found the measurement of many of the variables difficult on the H plates and in some cases have omitted them.

The brightness of the variables was estimated directly by comparison with the known magnitudes of the comparison stars, usually only to the tenth of a magnitude. The mean magnitudes given in the table, however, are expressed to hundredths, but when either observer considered the image too difficult for measurement, so that only one determination was obtained, the result is given only to tenths. A description of the plates used is contained in Table XLI. The first column gives the series and number of the plate, the second column, the year, month, and day in which the plate was made, and the third column, the Julian date of the mean time of the observation, expressed to thousandths of a day. These dates have been corrected for the equation of light. The fourth and fifth columns contain the duration of the exposure expressed in minutes, and the quality of the plate on a scale of 5, in which 1 is worthless, 2 poor, 3 fair, 4 good, and 5 excellent. Table XLII contains the results of the measurement of the variables on the 75 selected plates, except that, for convenience in printing, the results for the last two plates are given in Table XLIII. The Julian date is given in the first column of each page in Table XLII, and refers equally to all the stars given on the same page. Three columns are used for each variable as in the preceding parts of this volume, the first column containing the observed magnitude, the second, the phase of the observation, or the time since the last computed maximum, and the third, the corresponding deviation of this magnitude from a smooth curve drawn through all the observations plotted according to phase. In the third column, positive values signify that the measured magnitude is fainter, and negative values, printed in Italics, that it is brighter than is indicated by the mean light curve. Dots in the first column indicate that for some reason no measurement was made. This was due in some cases to defective stellar images and in other cases to the quality of the plate and the nearness of adjacent stars, which causes a confusion of the stellar images unless the definition of the plate is exceptionally good. This trouble increases toward the centre of the cluster, which is so dense that a detailed study of the individual stars becomes impossible on most plates. Dots in the second and third columns show that no period has been determined. Dots in the third column may also indicate that no precise magnitude was determined.

TABLE XLII

OBSERVATIONS OF THE VARIABLES

J. D.	No. 1. Per. $1^d.43744$			No. 2. Per. $0^d.663520$			No. 3. Per. $0^d.389150$			No. 4. Per. $0^d.313575$			No. 5. Per. $0^d.384533$			No. 6. Per. $0^d.665965$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		*d.*			*d.*			*d.*			*d.*			*d.*			*d.*	
3770.633	15.22	0.653	*20*	15.88	0.293	*06*	16.05	0.264	02	16.20	0.207	13	16.05	0.293	11	16.10	0.379	*05*
3815.548	15.55	1.007	02	15.70	0.089	15	15.58	0.038	14	15.35	0.281	*07*	15.95	0.215	01	15.30	0.008	10
" .635	15.10	1.094	*20*	15.78	0.176	*06*	16.00	0.125	21	15.52	0.054	11	15.55	0.302	*38*	15.40	0.095	*06*
3833.554	14.72	0.327	*31*	15.9	0.180	..	16.05	0.143	19	15.65	0.099	05	16.00	0.147	27	15.30	0.033	07
4086.763	15.25	0.546	*13*	16.05	0.587	12	15.49	0.015	12	15.90	0.253	12	16.15	0.320	35	16.0	0.175	..
4140.634	14.65	1.232	*12*	15.75	0.050	41	15.98	0.184	00	15.95	0.189	*13*	15.60	0.354	18	15.45	0.103	*05*
4200.535	15.45	0.760	*02*	15.90	0.234	00	16.08	0.156	18	16.15	0.198	07	16.15	0.265	15	15.62	0.067	29
4210.527	15.45	0.690	00	15.88	0.273	*05*	15.58	0.030	16	15.75	0.155	*20*	16.00	0.258	00	15.52	0.070	18
4212.581	14.42	1.307	*09*	15.80	0.337	*14*	15.99	0.138	15	15.42	0.014	09	15.30	0.005	*03*	15.58	0.126	*02*
6761.629	15.1	0.336	..	16.0	0.141	..	15.65	0.253	*38*	15.22	0.011	*10*	15.90	0.236	*08*	15.9	0.526	..
6767.536	15.20	0.494	*10*	15.50	0.076	02	15.60	0.323	11	15.58	0.273	09	15.55	0.375	21	15.80	0.439	*41*
8183.646	15.15	0.725	*31*	15.75	0.234	*15*	15.46	0.316	*06*	15.55	0.279	12	15.90	0.176	08	15.15	0.042	*10*
0724.652	15.18	0.337	12	15.20	0.623	*02*	15.88	0.173	*07*	15.52	0.073	05	15.45	0.056	01	16.18	0.391	00
" .669	15.15	0.354	05	15.22	0.640	08	15.98	0.190	00	15.62	0.090	06	15.45	0.073	*05*	16.15	0.408	*05*
" .699	15.20	0.384	04	15.30	0.006	14	15.94	0.220	*06*	15.70	0.120	00	15.55	0.103	*04*	16.05	0.438	*17*
" .703	15.20	0.388	03	15.18	0.010	01	16.12	0.224	10	15.75	0.124	02	15.55	0.107	*05*	16.22	0.442	00
" .733	15.12	0.418	*10*	15.45	0.040	17	16.05	0.254	02	16.05	0.154	10	15.55	0.137	*15*	16.15	0.472	*09*
" .738	15.18	0.423	*05*	15.21	0.045	*09*	16.05	0.259	02	15.85	0.159	*13*	15.60	0.142	*12*	16.22	0.477	*02*
" .764	15.25	0.449	00	15.45	0.071	*01*	15.90	0.285	*05*	16.00	0.185	*07*	15.60	0.168	*20*	16.15	0.503	*11*
" .794	15.28	0.479	*01*	15.80	0.101	17	15.60	0.315	08	15.95	0.215	*07*	15.90	0.198	00	16.18	0.533	*09*
" .798	15.52	0.483	23	15.68	0.107	04	15.52	0.319	01	16.10	0.219	09	16.05	0.202	14	16.36	0.537	09
" .825	15.30	0.510	*02*	15.75	0.134	01	15.52	0.346	12	15.80	0.246	*05*	16.00	0.229	03	16.35	0.564	06
" .839	15.50	0.524	16	15.65	0.148	*12*	15.48	0.360	11	15.65	0.260	00	16.15	0.243	16	16.38	0.578	08
" .856	15.48	0.541	12	15.82	0.165	01	15.22	0.377	*13*	15.40	0.277	*06*	16.20	0.260	20	16.28	0.595	00
" .862	15.35	0.547	*02*	15.70	0.171	*13*	15.32	0.383	*03*	15.28	0.283	*12*	16.15	0.266	15	16.10	0.601	*15*
" .894	15.25	0.579	*14*	15.98	0.203	10	15.45	0.026	06	15.28	0.001	*03*	16.20	0.298	26	15.32	0.633	*30*
" .911	15.38	0.596	*02*	16.00	0.220	11	15.52	0.043	04	15.38	0.018	05	15.55	0.315	*29*	15.15	0.650	*08*
" .946	15.45	0.631	03	16.05	0.255	13	15.58	0.078	*02*	15.40	0.053	*01*	15.55	0.350	12	15.25	0.019	05
" .982	15.42	0.667	*01*	15.98	0.291	05	15.65	0.114	*10*	15.59	0.089	06	15.30	0.001	*03*	15.28	0.055	*01*
" .987	15.55	0.672	12	16.05	0.296	11	15.74	0.119	*03*	15.58	0.094	00	15.30	0.006	*03*	15.28	0.060	*02*
0725.653	14.60	1.338	16	15.95	0.296	01	15.42	0.006	08	15.65	0.133	*15*	15.60	0.287	*37*	15.25	0.060	*05*
" .677	14.38	1.362	*03*	15.92	0.320	*03*	15.42	0.030	01	15.95	0.157	*02*	15.60	0.311	*27*	15.30	0.084	*11*
" .711	14.48	1.396	10	16.12	0.354	17	15.55	0.064	*01*	15.70	0.191	*38*	15.52	0.345	05	15.75	0.118	17
" .721	14.48	1.406	11	15.92	0.364	*03*	15.54	0.074	*05*	16.00	0.201	*07*	15.30	0.355	*10*	15.80	0.128	18
" .729	14.42	1.414	06	16.08	0.372	13	15.60	0.082	*01*	16.00	0.209	*05*	15.35	0.363	00	15.65	0.136	01
" .792	14.38	0.040	00	15.98	0.435	03	15.65	0.145	*22*	15.40	0.272	*13*	15.45	0.042	05	15.78	0.199	*08*
" .812	14.45	0.060	03	15.98	0.455	03	15.82	0.165	*11*	15.35	0.292	02	15.55	0.062	09	15.75	0.219	*17*
" .821	14.52	0.069	09	15.90	0.464	*05*	15.78	0.174	*17*	15.38	0.301	06	15.50	0.071	02	16.10	0.228	16
" .852	14.46	0.100	*02*	16.00	0.495	05	16.05	0.205	05	15.35	0.019	02	15.50	0.102	*10*	16.00	0.259	00
" .857	14.41	0.105	*08*	16.00	0.500	05	16.00	0.210	00	15.28	0.024	*06*	15.50	0.107	*11*	16.02	0.264	00
" .916	14.68	0.164	07	15.98	0.559	04	16.12	0.269	09	15.52	0.083	00	15.75	0.166	*05*	16.11	0.323	00
" .926	14.52	0.174	*12*	15.82	0.569	*12*	15.95	0.279	*06*	15.60	0.093	05	15.60	0.176	*23*	16.19	0.333	07
" .937	14.52	0.185	*15*	15.90	0.580	*03*	15.94	0.290	04	15.55	0.104	*08*	15.80	0.187	*06*	16.28	0.344	15
" .967	14.72	0.215	*03*	15.22	0.610	*12*	15.52	0.320	02	15.58	0.134	*24*	15.95	0.217	01	16.12	0.374	*04*
" .972	14.85	0.220	08	15.22	0.615	*08*	15.52	0.325	05	16.05	0.139	22	16.05	0.222	09	16.25	0.379	09
" .981	15.00	0.229	21	15.05	0.624	*16*	15.50	0.334	07	15.95	0.148	05	16.10	0.231	12	16.02	0.388	*15*
" .994	14.9	0.242	..	15.18	0.637	02	15.5	0.347	..	16.05	0.161	06	15.75	0.244	*25*	16.05	0.401	*13*
1099.717	15.05	0.230	25	15.60	0.135	*13*	15.68	0.097	01	15.62	0.102	01	15.60	0.181	*25*	16.25	0.518	*01*
" .737	15.02	0.250	17	15.61	0.155	*18*	15.48	0.117	*28*	16.00	0.122	28	15.60	0.201	*31*	16.25	0.538	*02*
" .772	15.10	0.285	17	15.59	0.190	*27*	15.98	0.152	09	16.20	0.157	23	15.90	0.236	*08*	16.35	0.573	05

J. D.	No. 1. Per. 1d.43744			No. 2. Per. 0d.663520			No. 3. Per. 0d.389150			No. 4. Per. 0d.313575			No. 5. Per. 0d.384533			No. 6. Per. 0d.665965		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		d.			d.			d.			d.			d.			d.	
1099.917	15.40	0.430	16	15.95	0.335	01	15.58	0.297	*12*	15.35	0.302	03	15.50	0.381	16	15.30	0.052	03
1113.627	15.05	1.203	15	15.90	0.111	25	15.22	0.387	*13*	16.10	0.215	08	15.70	0.247	*30*	16.38	0.443	16
" .636	14.92	1.212	07	15.90	0.120	20	15.28	0.007	*06*	15.95	0.224	*03*	15.58	0.256	*42*	16.32	0.452	09
" .683	14.58	1.259	*06*	16.11	0.167	30	15.55	0.054	04	15.40	0.271	*14*	15.60	0.303	*31*	16.18	0.499	*07*
" .721	14.49	1.297	*03*	15.98	0.205	10	15.62	0.092	*03*	15.28	0.309	*03*	15.60	0.341	10	16.18	0.537	*09*
" .763	14.48	1.339	05	15.92	0.247	00	15.90	0.134	06	15.48	0.037	11	15.40	0.383	07	16.28	0.579	*02*
" .775	14.52	1.351	10	15.95	0.259	02	15.82	0.146	*06*	15.40	0.049	02	15.40	0.011	07	16.28	0.591	00
" .811	14.42	1.387	04	16.08	0.295	14	15.98	0.182	00	15.55	0.085	03	15.30	0.047	*12*	15.80	0.627	04
" .897	14.38	0.036	00	15.75	0.381	*20*	15.85	0.268	*18*	16.05	0.171	02	15.55	0.133	*13*	15.18	0.047	*08*
" .921	14.30	0.060	*11*	15.78	0.405	*17*	15.52	0.292	*28*	15.92	0.195	*16*	15.65	0.157	*11*	15.32	0.071	*02*
" .930	14.38	0.069	*04*	15.68	0.414	*27*	15.60	0.301	04	16.05	0.204	*01*	15.60	0.166	*19*	15.42	0.080	04
1128.623	15.42	0.388	26	15.9	0.510	..	16.1	0.206	..	16.10	0.159	13	16.20	0.246	20	15.8	0.121	..
1132.533	14.42	1.422	06	15.62	0.439	*33*	15.65	0.225	*37*	15.40	0.307	09	15.90	0.310	02	....	....	..
" .660	14.68	0.112	17	15.8	0.566	..	15.45	0.352	07	16.00	0.120	30	15.50	0.043	09	....	....	..
1133.533	15.52	0.985	*01*	15.65	0.112	00	15.48	0.057	*04*	15.60	0.052	20	15.60	0.147	*13*	16.2	0.370	..
" .612	15.45	1.064	05	15.9	0.191	..	16.00	0.136	16	15.55	0.131	*23*	16.00	0.226	03	16.1	0.449	..
1135.582	14.42	0.159	*18*	15.9	0.170	..	15.9	0.160	..	16.05	0.220	05	16.00	0.273	01	....	....	..
" .618	14.42	0.195	*28*	15.9	0.206	..	16.0	0.196	..	15.78	0.256	03	16.00	0.319	18	15.9	0.457	..
1137.574	15.50	0.714	04	15.9	0.171	..	16.0	0.207	..	15.25	0.017	*08*	15.55	0.343	07	....	....	..
1139.618	14.42	1.321	*05*	15.8	0.225	..	15.6	0.305	..	16.25	0.179	18	15.50	0.079	00	....	....	..
1163.490	15.6	0.756	..	15.6	0.210	..	15.6	0.050	..	16.10	0.220	10	15.50	0.109	*11*	....	....	..
" .548	15.50	0.814	00	15.90	0.268	*03*	16.1	0.108	..	15.42	0.278	*04*	16.05	0.167	25	15.9	0.416	..
1164.471	14.95	0.300	*02*	15.8	0.528	..	15.5	0.252	..	15.85	0.260	20	15.40	0.321	*34*	15.2	0.007	..

J. D.	No. 7. Per. 0d.348796			No. 8. Per. 0d.646245			No. 9. Per. 0d.715270			No. 10. Per. 0d.39785			No. 11. Per. 0d.3435585			No. 12. Per. 0d.592916		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		d.			d.			d.			d.			d.			d.	
3770.633	15.52	0.282	*41*	15.85	0.433	*26*	15.85	0.215	13	15.65	....	..	16.12	0.287	18	15.15	0.003	*07*
3815.548	15.80	0.202	*34*	15.42	0.111	*12*	15.50	0.068	20	16.05	....	..	16.05	0.195	01	15.95	0.449	*18*
" .635	16.0	0.289	..	15.70	0.198	*11*	15.78	0.155	21	16.05	....	..	15.75	0.282	*23*	15.18	0.536	*19*
3833.554	15.48	0.071	*27*	15.18	0.022	*06*	15.70	0.192	03	15.40	....	..	15.35	0.336	04	15.50	0.075	10
4086.763	15.55	0.054	*12*	16.1	0.549	..	15.80	0.196	12	15.92	....	..	16.05	0.343	77	15.55	0.109	00
4140.634	....	....	..	15.51	0.136	*12*	15.88	0.421	*07*	15.9	....	..	16.00	0.275	*03*	15.18	0.024	*06*
4200.535	15.78	0.118	*13*	15.80	0.582	*15*	15.88	0.240	12	16.05	....	..	15.65	0.053	24	15.15	0.041	*14*
4210.527	15.50	0.344	*06*	15.98	0.234	06	15.80	0.218	07	16.10	....	..	15.78	0.082	16	16.02	0.546	*72*
4212.581	16.02	0.305	30	16.02	0.249	08	15.58	0.126	08	15.70	....	..	15.82	0.075	25	15.78	0.229	*19*
6761.629	....	....	..	15.30	0.607	*20*	15.10	0.667	*16*	15.70	....	..	16.00	0.263	*05*	15.90	0.331	*21*
6767.536	15.42	0.330	*14*	15.18	0.052	*14*	15.52	0.137	00	15.55	....	..	15.45	0.329	12	15.82	0.309	*27*
8183.646	15.30	0.328	*27*	15.80	0.239	*13*	15.12	0.012	*01*	15.50	....	..	15.98	0.291	06	15.35	0.535	*05*
0724.652	15.82	0.006	26	15.95	0.210	10	16.01	0.379	08	15,75	0.102	00	15.45	0.338	15	16.00	0.303	*09*
" .669	15.71	0.023	13	15.90	0.227	00	15.88	0.396	*06*	15.65	0.119	*16*	15.12	0.011	*16*	16.20	0.320	10
" .699	15.72	0.053	06	16.02	0.257	05	15.95	0.426	00	15.90	0.149	02	15.35	0.041	02	16.20	0.350	09
" .703	15.82	0.057	14	15.88	0.261	*10*	15.80	0.430	*15*	15.78	0.153	*12*	15.30	0.045	*06*	16.10	0.354	*01*
" .733	15.70	0.087	*12*	15.95	0.291	*07*	15.95	0.460	*01*	15.98	0.183	01	15.50	0.075	*06*	16.15	0.384	02
" .738	15.90	0.092	06	16.20	0.296	18	15.98	0.465	01	15.95	0.188	*03*	15.68	0.083	06	16.20	0.389	07
" .764	16.00	0.118	05	16.04	0.322	*01*	15.82	0.491	*15*	16.00	0.214	*01*	15.82	0.106	08	16.15	0.415	02
" .794	16.30	0.148	24	16.20	0.352	13	16.15	0.521	17	15.95	0.244	*08*	15.82	0.136	*06*	16.18	0.445	05
" .798	16.22	0.152	16	16.02	0.356	*05*	15.92	0.525	*05*	16.10	0.248	07	15.85	0.140	*05*	16.05	0.449	*08*
" .825	16.15	0.179	03	16.20	0.383	11	15.90	0.552	*08*	16.05	0.275	01	16.05	0.167	05	16.02	0.476	*09*
" .839	16.32	0.193	18	16.22	0.397	13	16.15	0.566	17	16.00	0.289	*03*	16.10	0.181	06	16.04	0.490	*05*

J. D.	No. 7. Per. 0d.348796			No. 8. Per. 0d.646245			No. 9. Per. 0d.715270			No. 10. Per. 0d.39785			No. 11. Per. 0d.3435585			No. 12. Per. 0d.592916		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		d.			d.			d.			d.			d.			d.	
0724.856	16.18	0.210	04	15.95	0.414	*16*	16.10	0.583	14	15.95	0.306	*03*	15.98	0.198	*07*	15.78	0.507	*19*
" .862	15.95	0.216	*20*	16.1	0.420	..	15.90	0.589	*04*	15.90	0.312	*04*	15.95	0.204	*10*	15.88	0.513	*02*
" .894	16.00	0.248	*14*	15.92	0.452	*20*	15.70	0.621	*06*	15.58	0.344	*08*	16.00	0.236	*07*	15.50	0.545	18
" .911	15.80	0.265	*30*	15.92	0.469	*21*	15.35	0.638	*15*	15.72	0.361	12	16.05	0.253	*01*	15.25	0.562	01
" .946	15.48	0.300	*25*	16.05	0.504	*09*	15.30	0.673	06	15.45	0.396	*06*	15.90	0.288	*04*	15.30	0.004	08
" .982	15.48	0.336	*08*	16.12	0.540	*01*	15.18	0.709	06	15.40	0.034	*14*	15.25	0.324	*09*	15.40	0.040	12
" .987	15.68	0.341	12	16.18	0.545	05	15.18	0.714	06	15.50	0.039	*05*	15.35	0.329	02	15.52	0.045	22
0725.653	15.88	0.310	22	16.25	0.564	15	15.38	0.665	10	15.82	0.307	*15*	15.55	0.309	28	15.98	0.118	38
" .677	15.59	0.334	03	15.80	0.588	*05*	15.25	0.689	09	15.50	0.331	*26*	15.22	0.333	*09*	15.88	0.142	17
" .711	15.49	0.019	*08*	15.35	0.622	02	15.20	0.008	07	15.60	0.365	02	15.18	0.023	*11*	15.88	0.176	06
" .721	15.65	0.029	06	15.30	0.632	04	15.18	0.018	04	15.62	0.375	07	15.22	0.033	*11*	16.05	0.186	19
" .729	15.58	0.037	*03*	15.28	0.640	05	15.30	0.026	13	15.35	0.383	*19*	15.28	0.041	*06*	16.00	0.194	13
" .792	15.85	0.100	*03*	15.35	0.047	04	15.30	0.089	*07*	15.75	0.048	17	15.75	0.104	01	16.22	0.257	20
" .812	15.80	0.120	*16*	15.42	0.077	01	15.50	0.109	06	15.75	0.068	11	15.82	0.124	*01*	16.08	0.277	04
" .821	16.10	0.129	10	15.50	0.086	06	15.42	0.118	*05*	15.88	0.077	21	15.88	0.133	01	16.10	0.286	03
" .852	16.20	0.160	11	15.55	0.117	*01*	15.52	0.149	*03*	15.82	0.108	05	16.00	0.164	00	16.20	0.317	10
" .857	15.98	0.165	*12*	15.60	0.122	03	15.58	0.154	01	15.95	0.113	16	16.05	0.169	04	16.18	0.322	07
" .916	16.29	0.224	14	15.65	0.181	*12*	15.70	0.213	*03*	15.95	0.172	00	16.05	0.228	*01*	16.10	0.381	*03*
" .926	16.40	0.234	25	15.88	0.191	09	15.70	0.223	*04*	16.02	0.182	05	16.20	0.238	13	16.20	0.391	07
" .937	16.02	0.245	*13*	15.82	0.202	*01*	15.85	0.234	09	15.98	0.193	*01*	15.95	0.249	*12*	16.12	0.402	*01*
" .967	16.20	0.275	19	15.94	0.232	02	15.79	0.264	*02*	16.08	0.223	06	15.90	0.279	*11*	16.05	0.432	*08*
" .972	16.08	0.280	10	16.0	0.237	..	15.80	0.269	*03*	16.02	0.228	00	15.92	0.284	*04*	16.00	0.437	*13*
" .981	16.12	0.289	29	15.85	0.246	*10*	15.70	0.278	*13*	15.95	0.237	*08*	15.95	0.293	05	16.10	0.446	*03*
" .994	15.9	0.302	..	16.0	0.259	..	15.75	0.291	*10*	16.05	0.250	02	15.75	0.306	15	16.10	0.459	*02*
1099.717	16.15	0.116	21	16.12	0.452	00	15.38	0.642	*10*	15.58	0.393	07	16.00	0.237	*06*	15.45	0.052	13
" .737	16.25	0.136	23	16.08	0.472	*05*	15.25	0.662	*06*	15.35	0.014	*16*	16.15	0.257	09	15.35	0.072	*03*
" .772	16.22	0.171	11	16.15	0.507	01	15.18	0.697	04	15.58	0.049	01	16.00	0.292	10	15.72	0.107	18
" .917	15.80	0.316	17	15.28	0.006	06	15.42	0.127	*08*	16.00	0.194	01	15.70	0.095	01	16.00	0.252	*02*
1113.627	15.95	0.074	19	15.65	0.145	00	15.78	0.247	*01*	15.58	0.378	03	15.28	0.061	*20*	....	....	..
" .636	16.08	0.083	28	15.79	0.154	11	15.88	0.256	08	15.70	0.389	18	15.55	0.070	03	16.28	0.325	17
" .683	16.20	0.130	20	15.75	0.201	*07*	16.05	0.303	18	15.60	0.036	06	15.82	0.117	02	16.35	0.334	24
" .721	16.32	0.168	21	15.85	0.239	*08*	16.05	0.341	13	15.75	0.074	08	15.95	0.155	*01*	16.28	0.381	16
" .763	16.34	0.210	19	16.00	0.281	00	15.85	0.383	*08*	15.82	0.116	02	16.05	0.197	01	16.10	0.461	*02*
" .775	16.25	0.222	10	16.00	0.293	*02*	15.85	0.395	*09*	15.90	0.128	07	16.10	0.209	05	16.12	0.473	01
" .811	15.98	0.258	*16*	16.15	0.329	11	15.98	0.431	02	15.88	0.164	*05*	16.08	0.245	01	16.05	0.509	09
" .897	15.72	0.344	16	16.25	0.415	15	15.80	0.517	*18*	16.10	0.250	07	15.40	0.331	08	15.35	0.002	13
" .921	15.71	0.019	14	16.05	0.439	*06*	15.98	0.541	00	16.00	0.274	*04*	15.40	0.013	12	15.40	0.026	16
" .930	15.88	0.028	29	16.05	0.448	*06*	15.85	0.550	*13*	16.08	0.283	05	15.35	0.022	05	15.40	0.035	13
1128.623	15.80	0.071	05	15.9	0.277	..	15.70	0.223	*03*	16.05	....	..	15.80	0.284	*17*	15.95	0.498	*11*
1132.533	16.15	0.145	11	16.1	0.310	..	16.15	0.556	17	16.00	....	..	15.70	0.071	16	16.02	0.258	00
" .660	15.80	0.272	*23*	15.90	0.437	*21*	15.35	0.683	15	15.80	....	..	15.98	0.198	*07*	15.88	0.385	*25*
1133.533	16.1	0.098	..	15.22	0.017	*01*	15.48	0.126	00	16.05	....	..	15.50	0.041	15	15.20	0.072	*17*
" .612	15.9	0.177	..	15.8	0.096	..	15.62	0.205	*08*	16.05	....	..	15.65	0.120	*17*	15.90	0.151	16
1135.582	15.9	0.054	..	15.8	0.128	..	15.28	0.029	11	16.0	....	..	15.35	0.028	04	15.88	0.342	*23*
" .618	15.7	0.090	..	15.8	0.164	..	15.42	0.065	13	15.90	....	..	15.45	0.064	*05*	16.05	0.378	*08*
1137.574	....	....	..	15.75	0.181	*02*	15.75	0.590	*19*	15.80	....	..	15.45	0.303	*25*	15.18	0.556	*08*
1139.618	....	....	..	16.1	0.286	..	15.80	0.488	*17*	15.90	....	..	15.70	0.286	*25*	15.70	0.228	*27*
1163.490	....	....	..	15.8	0.247	..	15.10	0.041	*13*	15.65	....	..	15.88	0.108	13	15.95	0.383	*18*
" .548	....	....	..	15.9	0.305	..	15.28	0.099	*13*	15.65	....	..	16.00	0.166	00	15.95	0.441	*18*
1164.471	....	....	..	....	....	..	15.6	0.307	..	15.9	....	..	15.55	0.059	10	15.85	0.178	03

J. D.	No. 13. Per. $0^d.574970$			No. 14. Per. $0^d.382000$			No. 15. Per. $0^d.584243$			No. 16. Per. $0^d.69464$			No. 17. Per. $0^d.666979$			No. 18. Per. $0^d.37816$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		*d.*			*d.*			*d.*			*d.*			*d.*			*d.*	
3770.633	16.25	0.403	08	16.10	0.173	18	16.17	0.433	01	....	....	..	15.22	0.003	*19*	15.95	....	..
3815.548	16.05	0.470	*15*	15.50	0.012	06	16.17	0.361	03	....	....	..	15.85	0.230	02	15.88	....	..
" .635	15.12	0.557	*03*	15.55	0.099	01	15.65	0.448	*51*	....	....	..	15.65	0.317	*22*	15.55	....	..
3833.554	15.55	0.077	13	15.60	0.064	12	16.07	0.256	07	....	....	..	15.82	0.228	*01*	15.82	....	..
4086.763	16.10	0.299	00	15.35	0.007	*09*	16.07	0.488	*03*	....	....	..	15.68	0.652	27	15.80	....	..
4140.634	15.80	0.123	14	15.60	0.016	16	15.20	0.024	*03*	....	....	..	15.88	0.498	*02*	15.90	....	..
4200.535	16.10	0.227	09	15.50	0.325	*14*	16.30	0.332	17	....	....	..	15.82	0.371	*08*	15.92	....	..
4210.527	16.12	0.445	*08*	15.55	0.003	11	16.20	0.392	05	....	....	..	16.00	0.358	10	15.95	....	..
4212.581	15.85	0.199	*08*	15.80	0.147	02	15.42	0.109	02	....	....	..	15.80	0.411	*10*	15.78	....	..
6761.629	16.05	0.405	*12*	15.70	0.109	11	15.33	0.105	*06*	....	....	..	15.92	0.265	06	15.38	....	..
6767.536	15.30	0.562	16	16.00	0.286	02	15.68	0.169	05	....	....	..	16.05	0.169	27	15.30	....	..
8183.646	15.78	0.521	*17*	15.75	0.322	07	15.62	0.074	29	....	....	..	15.80	0.283	*08*	15.45	....	..
0724.652	15.91	0.160	10	15.95	0.264	*05*	15.97	0.208	16	15.80	0.102	13	15.68	0.099	06	15.90	0.290	02
" .669	15.88	0.177	01	16.10	0.281	11	16.03	0.225	14	15.82	0.119	12	15.45	0.116	*22*	15.82	0.307	10
" .699	16.00	0.207	04	15.90	0.311	11	16.07	0.255	07	15.65	0.149	*09*	15.55	0.146	*18*	15.48	0.337	*08*
" .703	15.70	0.211	*27*	15.90	0.315	15	16.10	0.259	09	15.80	0.153	06	15.55	0.150	*19*	15.58	0.341	04
" .733	16.00	0.241	*03*	15.55	0.345	03	16.05	0.289	*02*	15.78	0.183	01	15.62	0.180	*17*	15.45	0.371	*05*
" .738	16.10	0.246	06	15.50	0.350	*01*	16.03	0.294	*05*	15.75	0.188	*03*	15.68	0.185	*12*	15.45	0.376	*05*
" .764	16.05	0.272	*04*	15.55	0.376	11	16.05	0.320	*06*	15.78	0.214	*03*	15.72	0.211	*11*	15.40	0.024	*13*
" .794	16.18	0.302	07	15.50	0.024	06	16.07	0.350	*06*	15.75	0.244	*07*	15.72	0.241	*13*	15.65	0.054	*01*
" .798	16.18	0.306	06	15.45	0.028	00	16.13	0.354	00	15.65	0.248	*17*	15.85	0.245	00	15.82	0.058	15
" .825	16.25	0.333	11	15.55	0.055	09	16.13	0.381	*01*	15.80	0.275	*03*	15.90	0.272	04	15.82	0.085	02
" .839	16.18	0.347	03	15.50	0.069	02	16.05	0.395	*10*	15.75	0.289	*09*	15.92	0.286	06	15.82	0.099	*01*
" .856	16.18	0.364	02	15.55	0.086	03	16.00	0.412	*16*	15.82	0.306	*05*	15.80	0.303	*07*	15.92	0.116	02
" .862	16.15	0.370	*01*	15.60	0.092	07	16.02	0.418	*14*	15.70	0.312	*16*	15.90	0.309	03	15.82	0.122	*10*
" .894	16.10	0.402	*07*	15.55	0.124	*11*	16.07	0.450	*08*	15.90	0.344	01	15.88	0.341	*01*	15.92	0.154	*05*
" .911	16.18	0.419	00	15.75	0.141	01	16.17	0.467	03	16.05	0.361	15	15.88	0.358	*02*	16.10	0.171	12
" .946	16.18	0.454	*02*	15.95	0.176	02	15.80	0.502	*10*	16.00	0.396	09	15.82	0.393	*08*	16.00	0.206	00
" .982	16.22	0.490	02	15.95	0.212	*05*	15.22	0.538	*13*	15.98	0.432	05	15.82	0.429	*08*	15.90	0.242	*10*
" .987	16.15	0.495	*04*	16.10	0.217	10	15.33	0.543	03	16.00	0.437	07	15.79	0.434	*11*	16.00	0.247	00
0725.653	15.12	0.011	*01*	15.70	0.119	08	15.43	0.040	18	15.88	0.408	*04*	16.05	0.433	15	16.05	0.157	08
" .677	15.18	0.035	*03*	15.65	0.143	*10*	15.47	0.064	17	15.85	0.432	*08*	15.92	0.457	02	16.05	0.181	06
" .711	15.25	0.069	*13*	15.85	0.177	*08*	15.55	0.098	18	15.75	0.466	*18*	15.88	0.491	*02*	15.92	0.215	*08*
" .721	15.45	0.079	02	16.05	0.187	08	15.55	0.108	14	15.95	0.476	01	16.08	0.501	18	16.05	0.225	05
" .729	15.55	0.087	07	16.00	0.195	02	15.57	0.116	14	15.92	0.484	*03*	15.98	0.509	08	15.98	0.233	*02*
" .792	15.72	0.150	*05*	16.10	0.258	10	15.73	0.179	05	15.95	0.547	*01*	15.82	0.572	*06*	15.70	0.296	*13*
" .812	15.82	0.170	*02*	16.05	0.278	06	15.95	0.199	19	15.98	0.567	02	15.68	0.592	*10*	15.58	0.316	*09*
" .821	15.85	0.179	*03*	16.10	0.287	13	15.90	0.208	08	15.88	0.576	*08*	15.82	0.601	11	15.70	0.325	08
" .852	16.08	0.210	11	15.85	0.318	13	15.90	0.239	*03*	15.80	0.607	*07*	15.25	0.632	*23*	15.50	0.356	*02*
" .857	16.00	0.215	02	15.70	0.323	03	16.02	0.244	06	15.90	0.612	*02*	15.18	0.637	*26*	15.52	0.361	01
" .916	16.10	0.274	01	15.40	0.000	*04*	16.03	0.303	*07*	15.45	0.671	*08*	15.60	0.029	16	15.60	0.042	00
" .926	16.18	0.284	08	15.30	0.010	*14*	16.12	0.313	01	15.60	0.681	10	15.50	0.039	04	15.72	0.052	07
" .937	16.28	0.295	18	15.35	0.021	*10*	16.17	0.324	05	15.50	0.692	00	15.40	0.050	*10*	15.70	0.063	*01*
" .967	16.18	0.325	05	15.45	0.051	*01*	16.20	0.354	07	15.60	0.028	07	15.50	0.080	*06*	15.82	0.093	00
" .972	16.10	0.330	*04*	15.50	0.056	03	16.17	0.359	04	15.65	0.033	10	15.50	0.085	*08*	15.95	0.098	12
" .981	16.12	0.339	*02*	15.40	0.065	*08*	16.05	0.368	*09*	15.40	0.042	*16*	15.58	0.094	*04*	16.00	0.107	13
" .994	15.90	0.352	*25*	15.50	0.078	00	15.93	0.381	*21*	15.4	0.055	..	15.72	0.107	08	15.70	0.120	*21*
1099.717	16.30	0.344	15	16.10	0.205	11	15.60	0.189	*12*	15.7	0.061	..	15.98	0.322	09	15.98	0.220	*02*
" .737	16.30	0.364	14	16.05	0.225	05	15.73	0.209	*09*	15.60	0.081	*04*	15.95	0.342	05	16.08	0.240	08
" .772	16.02	0.399	*15*	16.05	0.260	05	15.90	0.244	*06*	15.8	0.116	..	15.95	0.377	05	15.88	0.275	*09*

J. D.	No. 13. Per. $0^d.574970$			No. 14. Per. $0^d.382000$			No. 15. Per. $0^d.584243$			No. 16. Per. $0^d.69464$			No. 17. Per. $0^d.666979$			No. 18. Per. $0^d.37816$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		*d.*			*d.*			*d.*			*d.*			*d.*			*d.*	
1099.917	15.15	0.544	*18*	15.35	0.023	*10*	15.98	0.389	*18*	15.70	0.261	*13*	15.68	0.522	*22*	15.85	0.041	24
1113.627	16.25	0.455	05	15.55	0.363	08	15.25	0.077	*07*	15.70	0.079	06	15.88	0.225	05	16.05	0.139	11
" .636	16.02	0.464	*18*	15.50	0.372	05	15.33	0.086	*01*	15.65	0.088	00	15.85	0.234	01	16.18	0.148	22
" .683	16.30	0.511	25	15.60	0.037	15	15.45	0.133	*04*	15.75	0.135	02	15.85	0.281	*02*	16.10	0.195	10
" .721	15.20	0.549	00	15.45	0.075	*05*	15.58	0.171	*05*	15.75	0.173	*01*	15.82	0.319	*07*	15.98	0.233	*02*
" .763	15.20	0.016	07	15.80	0.117	18	15.87	0.213	04	15.95	0.215	15	15.90	0.361	00	15.82	0.275	*15*
" .775	15.20	0.028	01	15.85	0.129	18	15.65	0.225	*24*	15.95	0.227	13	15.88	0.373	*02*	15.70	0.287	*19*
" .811	15.60	0.064	26	15.95	0.165	08	15.87	0.261	*14*	16.00	0.263	17	15.90	0.409	00	15.50	0.323	*13*
" .897	15.85	0.150	09	16.05	0.251	05	16.20	0.347	07	15.98	0.349	08	15.88	0.495	*02*	15.68	0.030	12
" .921	15.72	0.174	*14*	16.10	0.275	11	16.12	0.371	*03*	15.88	0.373	*03*	15.72	0.519	*18*	15.68	0.054	03
" .930	15.80	0.183	*10*	16.00	0.284	01	16.17	0.380	01	15.78	0.382	*14*	15.70	0.528	*19*	15.82	0.063	11
1128.623	16.10	0.502	*06*	15.50	0.079	00	16.17	0.467	02	....	....	..	15.82	0.548	*07*	15.75	....	..
1132.533	16.12	0.387	*04*	15.85	0.169	*05*	16.00	0.287	*07*	....	....	..	15.90	0.456	00	15.50	....	..
" .660	16.10	0.514	09	15.80	0.296	*13*	16.20	0.414	04	....	....	..	16.00	0.583	16	15.75	....	..
1133.533	16.10	0.237	08	15.25	0.023	*20*	15.33	0.118	*10*	....	....	..	15.88	0.122	19	15.88	....	..
" .612	16.00	0.316	*13*	15.65	0.102	09	16.03	0.197	29	....	....	..	15.98	0.201	16	15.78	....	..
1135.582	15.12	0.561	*02*	16.00	0.162	15	16.03	0.415	*13*	....	....	..	15.85	0.170	07	15.65	....	..
" .618	15.18	0.022	02	16.05	0.198	07	16.23	0.451	07	....	....	..	15.90	0.206	08	15.82	....	..
1137.574	16.10	0.253	03	15.95	0.244	*05*	15.13	0.070	*18*	....	....	..	15.52	0.161	*24*	15.90	....	..
1139.618	15.12	0.572	00	15.45	0.378	01	16.20	0.361	05	....	....	..	16.00	0.204	17	15.75	....	..
1163.490	16.15	0.296	04	15.95	0.184	00	16.20	0.279	16	....	....	..	15.82	0.065	29	15.60	....	..
" .548	16.40	0.354	25	16.05	0.242	05	16.37	0.337	24	....	....	..	16.05	0.123	35	15.82	....	..
1164.471	15.85	0.127	18	15.30	0.019	*14*	15.18	0.092	*18*	....	....	..	15.90	0.379	00	15.85	....	..

J. D.	No. 19. Per. $0^d.572293$			No. 20. Per. $0^d.700570$			No. 21. Per. $0^d.624690$			No. 22. Per. $0^d.721728$			No. 23. Per. $0^d.632690$			No. 24. Per. $0^d.369697$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		*d.*			*d.*			*d.*			*d.*			*d.*			*d.*	
3770.633	15.85	0.113	40	15.8	0.590	..	....	....	..	16.0	0.543	..	15.92	0.263	08	15.78	0.263	*35*
3815.548	16.05	0.389	*05*	15.26	0.669	*05*	16.0	0.503	..	15.20	0.711	02	15.95	0.257	12	15.42	0.075	*15*
" .635	16.2	0.476	..	15.20	0.055	*23*	15.15	0.590	*12*	15.35	0.076	*01*	....	....	..	15.55	0.162	*42*
3833.554	15.45	0.082	25	15.80	0.460	*34*	....	....	..	15.25	0.674	00	15.35	0.548	*20*	15.38	0.336	*10*
4086.763	16.05	0.337	*05*	15.38	0.062	*06*	....	....	..	16.05	0.556	02	15.30	0.048	10	15.70	0.302	*12*
4140.634	16.3	0.413	..	15.70	0.691	43	15.3	0.125	..	15.95	0.298	18	15.62	0.140	08	16.10	0.197	00
4200.535	16.10	0.223	12	15.82	0.342	*23*	15.62	0.056	24	16.02	0.295	25	15.32	0.569	05	15.65	0.207	*49*
4210.527	16.02	0.486	*07*	16.02	0.527	*15*	15.98	0.053	60	15.90	0.183	31	15.92	0.437	*03*	15.88	0.218	*29*
4212.581	16.00	0.251	*04*	16.00	0.478	*17*	15.75	0.233	*23*	15.65	0.072	30	15.35	0.592	21	15.40	0.053	*10*
6761.629	16.05	0.306	*04*	15.23	0.152	*45*	....	....	..	15.12	0.698	*06*	16.0	0.533	..	15.50	0.041	03
6767.536	15.92	0.490	*16*	15.80	0.455	*34*	16.1	0.206	..	15.25	0.110	*19*	15.5	0.113	..	15.38	0.032	*07*
8183.646	15.70	0.175	*08*	15.7	0.012	..	....	....	..	16.0	0.189	..	16.0	0.263	..	15.90	0.203	*23*
0724.652	15.78	0.200	*10*	15.70	0.050	28	15.50	0.536	*15*	15.58	0.713	40	15.92	0.386	*03*	16.25	0.281	18
" .669	15.88	0.217	*05*	15.70	0.067	23	15.32	0.553	*15*	15.38	0.008	18	15.92	0.403	*03*	15.92	0.298	00
" .699	16.02	0.247	*02*	15.85	0.097	32	15.40	0.583	12	15.11	0.038	*15*	16.00	0.433	05	15.38	0.328	*12*
" .703	16.20	0.251	15	15.70	0.101	15	15.36	0.587	09	15.10	0.042	*17*	15.95	0.437	00	15.45	0.332	*03*
" .733	16.08	0.281	01	15.60	0.131	*02*	15.35	0.617	10	15.18	0.072	*17*	15.92	0.467	*03*	15.45	0.362	03
" .738	16.02	0.286	*07*	15.80	0.136	17	15.50	0.622	25	15.18	0.077	*18*	15.85	0.472	*10*	15.32	0.367	*10*
" .764	16.05	0.312	*04*	15.70	0.162	00	15.35	0.023	05	15.18	0.103	*25*	15.95	0.498	00	15.35	0.024	*10*
" .794	16.00	0.342	*10*	15.82	0.192	04	14.95	0.053	*42*	15.22	0.133	*28*	16.00	0.528	05	15.65	0.054	15
" .798	16.05	0.346	*05*	15.95	0.196	16	15.52	0.057	13	15.22	0.137	*30*	16.00	0.532	07	15.58	0.058	07
" .825	16.20	0.373	10	16.10	0.223	24	15.72	0.084	23	15.24	0.164	*33*	15.55	0.559	18	15.60	0.085	00
" .839	16.08	0.387	*02*	15.95	0.237	05	15.70	0.098	17	15.44	0.178	*15*	15.22	0.573	*01*	15.60	0.099	*03*

J. D.	No. 19.	Per. $0^d.572293$		No. 20.	Per. $0^d.700570$		No. 21.	Per. $0^d.624690$		No. 22.	Per. $0^d.721728$		No. 23.	Per. $0^d.632690$		No. 24.	Per. $0^d.369697$	
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		*d.*			*d.*			*d.*			*d.*			*d.*			*d.*	
0724.856	16.08	0.404	*02*	15.85	0.254	*08*	15.50	0.115	*10*	15.33	0.195	*29*	15.12	0.590	*03*	15.68	0.116	*03*
" .862	16.15	0.410	05	15.88	0.260	*06*	15.4	0.121	..	15.49	0.201	*14*	15.12	0.596	*01*	15.65	0.122	*08*
" .894	16.12	0.442	02	16.15	0.292	16	15.72	0.153	*01*	15.50	0.233	*18*	15.02	0.628	*05*	15.90	0.154	*03*
" .911	16.10	0.459	00	16.20	0.309	19	16.12	0.170	34	15.62	0.250	*09*	14.85	0.013	*23*	16.12	0.171	11
" .946	15.98	0.494	*08*	16.10	0.344	04	16.15	0.205	26	15.65	0.285	*10*	15.12	0.048	*08*	16.30	0.206	17
" .982	15.25	0.530	*20*	16.08	0.380	*01*	16.12	0.241	12	15.78	0.321	*01*	15.45	0.084	09	16.15	0.242	*02*
" .987	15.15	0.535	*05*	16.12	0.385	01	16.18	0.246	16	15.70	0.326	*11*	15.52	0.089	16	16.25	0.247	08
0725.653	15.18	0.056	16	16.22	0.350	16	16.00	0.287	*10*	15.72	0.270	*01*	15.60	0.122	11	16.07	0.173	06
" .677	15.30	0.080	12	16.05	0.374	*03*	16.30	0.311	17	15.88	0.294	11	15.45	0.146	*10*	16.15	0.197	04
" .711	15.40	0.114	*05*	16.10	0.408	*02*	16.02	0.345	*15*	15.70	0.328	*10*	15.70	0.180	05	16.08	0.231	*09*
" .721	15.62	0.124	10	16.45	0.418	33	16.05	0.355	*13*	15.74	0.338	*08*	15.62	0.190	*07*	16.30	0.241	13
" .729	15.72	0.132	15	16.12	0.426	*01*	16.00	0.363	*19*	15.88	0.346	04	15.75	0.198	05	16.00	0.249	*17*
" .792	15.80	0.195	*05*	16.20	0.489	04	16.01	0.426	*19*	15.83	0.409	*08*	15.90	0.261	06	15.58	0.312	*06*
" .812	15.88	0.215	*06*	16.20	0.509	03	16.06	0.446	*14*	16.05	0.429	12	15.82	0.281	*07*	15.40	0.332	*08*
" .821	15.82	0.224	*16*	16.50	0.518	33	16.38	0.455	18	15.80	0.438	*13*	15.88	0.290	*02*	15.45	0.341	00
" .852	16.02	0.255	*04*	16.30	0.549	13	15.95	0.486	*17*	16.10	0.469	13	16.00	0.321	06	15.48	0.003	06
" .857	16.10	0.260	04	16.35	0.554	19	15.78	0.491	*33*	15.88	0.474	*09*	16.08	0.326	14	15.48	0.008	05
" .916	16.12	0.319	02	15.85	0.613	*21*	15.50	0.550	00	15.98	0.533	*03*	15.92	0.385	*03*	15.60	0.067	07
" .926	15.95	0.329	*15*	15.95	0.623	*05*	15.62	0.560	24	....	....	..	15.95	0.395	00	15.62	0.077	05
" .937	16.15	0.340	05	15.62	0.634	*18*	15.38	0.571	05	15.95	0.554	*08*	15.98	0.406	03	15.62	0.088	01
" .967	16.02	0.370	*08*	15.18	0.664	*15*	15.30	0.601	04	16.12	0.584	08	15.95	0.436	00	15.80	0.118	08
" .972	16.15	0.375	05	15.15	0.669	*16*	15.35	0.606	10	16.00	0.589	*04*	15.92	0.441	*03*	15.72	0.123	*02*
" .981	16.00	0.384	*10*	15.20	0.678	*09*	15.38	0.615	13	16.02	0.598	*02*	15.95	0.450	00	15.85	0.132	05
" .994	16.00	0.397	*10*	15.18	0.691	*09*	15.3	0.003	..	16.1	0.611	..	15.85	0.463	*10*	15.7	0.145	..
1099.717	16.05	0.413	*05*	15.90	0.311	*12*	15.48	0.162	*26*	16.02	0.479	04	15.88	0.266	03	15.70	0.104	03
" .737	16.05	0.433	*05*	16.08	0.331	04	15.65	0.182	*17*	15.90	0.499	*09*	15.80	0.286	*10*	15.68	0.124	*06*
" .772	16.10	0.468	01	15.90	0.366	*17*	15.78	0.217	*15*	15.87	0.534	*15*	15.88	0.321	*05*	16.05	0.159	11
" .917	14.95	0.041	02	16.30	0.511	13	16.00	0.362	*19*	15.12	0.679	*11*	15.80	0.466	*15*	15.50	0.304	*25*
1113.627	14.95	0.016	08	15.77	0.209	*06*	16.05	0.328	*10*	15.11	0.677	*12*	15.90	0.257	07	15.55	0.335	08
" .636	14.72	0.025	*16*	15.82	0.218	*02*	16.12	0.337	*04*	15.18	0.686	*01*	15.80	0.266	*05*	15.60	0.344	15
" .683	14.95	0.072	*17*	16.10	0.265	16	16.20	0.384	00	15.16	0.011	*05*	15.80	0.313	*12*	15.60	0.021	16
" .721	15.15	0.110	*27*	16.00	0.303	00	16.15	0.422	*05*	15.30	0.049	01	15.90	0.351	*05*	15.70	0.059	19
" .763	15.45	0.152	*23*	16.00	0.345	*06*	16.25	0.464	05	15.23	0.091	*17*	15.88	0.393	*07*	15.78	0.101	12
" .775	15.50	0.164	*23*	16.02	0.357	*05*	16.28	0.476	12	15.35	0.103	*07*	15.72	0.405	*23*	16.10	0.113	40
" .811	15.70	0.200	*18*	16.05	0.393	*06*	16.18	0.512	14	15.65	0.139	14	15.82	0.441	*13*	16.25	0.149	35
" .897	16.20	0.286	11	16.10	0.479	*04*	15.06	0.599	*20*	15.76	0.225	09	15.88	0.527	*06*	16.22	0.235	05
" .921	16.20	0.310	11	16.05	0.503	*12*	15.38	0.622	13	15.85	0.249	14	15.35	0.551	*10*	15.92	0.259	*22*
1113.930	16.10	0.319	01	16.20	0.512	03	15.22	0.007	*04*	15.98	0.258	26	15.30	0.560	*05*	15.95	0.268	*17*
1128.623	15.70	0.132	13	16.0	0.493	..	....	....	..	15.6	0.516	..	15.52	0.068	22	16.2	0.174	..
1132.533	14.80	0.036	*10*	15.90	0.200	10	....	....	..	15.58	0.096	17	15.78	0.182	13	15.50	0.017	06
" .660	15.82	0.163	10	16.00	0.327	*03*	....	....	..	15.90	0.223	23	15.88	0.309	*05*	....	....	..
1133.533	16.15	0.464	05	16.00	0.499	*17*	....	....	..	15.82	0.374	*05*	15.40	0.550	*10*	16.1	0.278	..
" .612	15.78	0.543	70	16.1	0.578	..	....	....	..	15.95	0.453	01	15.20	0.629	13	15.6	0.357	..
1135.582	15.90	0.223	*08*	16.20	0.447	06	....	....	..	16.0	0.258	..	15.45	0.088	07	15.5	0.108	..
" .618	15.95	0.259	*11*	16.00	0.483	*16*	....	....	..	16.0	0.294	..	15.38	0.124	*12*	15.9	0.144	..
1137.574	16.15	0.499	11	16.1	0.337	..	....	....	..	15.78	0.085	40	15.70	0.162	10	....	....	..
1139.618	15.95	0.253	*10*	....	....	..	....	....	..	15.45	0.685	26	16.0	0.308	..	15.6	0.078	..
1163.490	15.20	0.089	*05*	15.9	0.332	..	....	....	..	15.6	0.018	..	15.75	0.137	23	16.0	0.289	..
" .548	15.42	0.147	*22*	16.0	0.390	..	....	....	..	15.5	0.076	..	15.68	0.195	*02*	15.45	0.347	01
1164.471	16.10	0.497	04	15.8	0.613	..	....	....	..	15.6	0.278	..	15.9	0.486	..	16.0	0.161	..

J. D.	No. 25.	Per. $0^d.665329$		No. 26.	Per. $0^d.402326$		No. 27.	Per. not det'd.		No. 28.	Per. $0^d.670640$		No. 29.	Per. $0^d.574062$		No. 30.	Per. $0^d.405976$	
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		*d.*			*d.*			*d.*			*d.*			*d.*			*d.*	
3770.633	15.22	0.618	*11*	15.9	0.193	..	16.8	....	..	16.05	0.415	*05*	16.1	0.233	..	15.95	0.152	09
3815.548	15.98	0.291	00	15.48	0.047	08	16.62	....	..	16.10	0.397	01	16.1	0.371	..	15.42	0.004	00
" .635	15.98	0.378	*02*	15.9	0.134	..	....	....	..	....	....	..	16.2	0.458	..	15.60	0.091	*02*
3833.554	16.00	0.333	00	15.70	0.351	23	*16.5*	....	..	16.15	0.296	17	15.20	0.007	06	15.75	0.147	*09*
4086.763	15.22	0.052	*04*	15.6	0.095	..	*16.8*	....	..	15.20	0.003	00	16.0	0.055	..	15.54	0.027	10
4140.634	15.25	0.031	05	15.60	0.054	17	16.8	....	..	16.00	0.223	12	15.15	0.538	01	15.35	0.309	*45*
4200.535	15.40	0.052	14	15.45	0.009	12	16.65	....	..	16.15	0.437	04	15.55	0.163	*16*	15.88	0.125	13
4210.527	15.30	0.065	*03*	15.18	0.344	*33*	16.85	....	..	16.02	0.369	*05*	16.00	0.396	*06*	15.38	0.374	*04*
4212.581	15.75	0.123	19	15.52	0.386	19	17.05	....	..	16.00	0.411	*10*	15.42	0.153	*24*	15.38	0.398	*04*
6761.629	16.05	0.295	07	....	....	..	....	....	..	....	....	..	16.2	0.366	..	15.35	0.323	*30*
6767.536	15.88	0.214	02	15.8	0.170	..	16.55	....	..	16.05	0.228	15	16.1	0.532	..	15.75	0.140	*06*
8183.646	15.98	0.500	*02*	16.0	0.092	..	*16.2*	....	..	15.35	0.617	*20*	16.2	0.431	..	15.80	0.206	*17*
0724.652	15.35	0.618	02	15.50	0.007	17	16.55	....	..	16.13	0.568	*02*	15.45	0.065	17	16.05	0.208	07
" .669	15.30	0.635	13	15.45	0.024	11	16.67	....	..	16.32	0.585	18	15.30	0.082	*04*	16.20	0.225	20
" .699	15.22	0.000	12	15.50	0.054	07	16.90	....	..	15.52	0.615	*08*	15.72	0.112	25	15.88	0.255	*12*
" .703	15.28	0.004	16	15.55	0.058	12	16.75	....	..	15.40	0.619	*10*	15.72	0.116	24	16.05	0.259	05
" .733	15.20	0.034	*02*	15.65	0.088	13	16.75	....	..	15.25	0.649	02	15.75	0.146	11	15.98	0.289	01
" .738	15.40	0.039	18	15.50	0.093	*04*	16.75	....	..	15.25	0.654	04	15.80	0.151	13	16.00	0.294	06
" .764	15.50	0.065	18	15.80	0.119	16	16.60	....	..	15.10	0.009	*11*	15.90	0.177	13	15.70	0.320	03
" .794	15.58	0.095	14	15.80	0.149	06	17.05	....	..	15.30	0.039	03	15.88	0.207	01	15.58	0.350	11
" .798	15.32	0.099	*13*	15.72	0.153	*02*	16.72	....	..	15.32	0.043	03	16.00	0.211	11	15.62	0.354	16
" .825	15.60	0.126	03	15.88	0.180	02	17.22	....	..	15.40	0.070	02	16.12	0.238	17	15.25	0.381	*17*
" .839	15.68	0.140	04	15.85	0.194	*05*	16.75	....	..	15.52	0.084	09	16.08	0.252	10	15.40	0.395	*02*
" .856	15.70	0.157	00	15.88	0.211	*05*	16.95	....	..	15.42	0.101	*08*	16.05	0.269	04	15.22	0.006	*21*
" .862	15.75	0.163	03	16.0	0.217	..	16.90	....	..	15.62	0.107	09	16.15	0.275	12	15.35	0.012	*08*
" .894	15.65	0.195	*15*	15.75	0.249	*22*	16.72	....	..	15.88	0.139	24	15.95	0.307	*09*	15.60	0.044	12
" .911	15.88	0.212	02	15.90	0.266	*07*	....	....	..	15.70	0.156	00	16.22	0.324	17	15.52	0.061	01
" .946	15.95	0.247	02	15.80	0.301	*08*	16.92	....	..	15.88	0.191	06	15.92	0.359	*14*	15.60	0.096	*03*
" .982	16.12	0.283	14	15.60	0.337	00	16.78	....	..	15.98	0.227	09	16.25	0.395	19	15.68	0.132	*10*
" .987	16.00	0.288	02	15.65	0.342	12	16.75	....	..	15.96	0.232	07	16.05	0.400	*01*	15.88	0.137	08
0725.653	16.05	0.289	07	15.98	0.203	07	16.55	....	..	15.88	0.228	*01*	15.80	0.492	*18*	15.70	0.397	28
" .677	16.00	0.313	01	16.00	0.227	05	16.75	....	..	15.86	0.252	*07*	15.20	0.516	*25*	15.78	0.015	35
" .711	15.95	0.347	*05*	15.98	0.261	01	16.70	....	..	16.05	0.286	07	15.12	0.550	*01*	15.80	0.049	32
" .721	15.90	0.357	*10*	15.98	0.271	02	16.60	....	..	16.00	0.296	01	15.20	0.560	07	15.58	0.059	08
" .729	16.10	0.365	10	15.90	0.279	*06*	17.00	....	..	15.95	0.304	*06*	15.20	0.568	07	15.68	0.067	15
" .792	16.02	0.428	02	15.70	0.342	17	17.00	....	..	16.38	0.367	31	15.25	0.057	01	15.92	0.130	14
" .812	15.95	0.448	*05*	15.52	0.362	13	16.70	....	..	16.05	0.387	*03*	15.25	0.077	*07*	15.88	0.150	03
" .821	15.95	0.457	*05*	15.30	0.371	*05*	16.42	....	..	16.02	0.396	*07*	15.32	0.086	*02*	15.80	0.159	*08*
" .852	16.03	0.488	03	15.52	0.402	19	16.65	....	..	16.00	0.427	*11*	15.55	0.117	05	15.98	0.190	03
" .857	16.08	0.493	08	15.60	0.005	27	16.85	....	..	16.08	0.432	*03*	15.50	0.122	*03*	16.12	0.195	16
" .916	16.00	0.552	00	15.55	0.064	09	16.82	....	..	15.98	0.491	*14*	15.98	0.181	18	16.02	0.254	02
" .926	15.92	0.562	*06*	15.38	0.074	*10*	16.55	....	..	16.02	0.501	*11*	15.90	0.191	06	15.75	0.264	*25*
" .937	15.88	0.573	*04*	15.60	0.085	08	16.80	....	..	16.05	0.512	*08*	15.75	0.202	*11*	15.98	0.275	*01*
" .967	15.45	0.603	*08*	15.65	0.115	02	17.00	....	..	16.25	0.542	11	16.15	0.232	21	15.78	0.305	*07*
" .972	15.28	0.608	*17*	15.58	0.120	*06*	16.95	....	..	16.16	0.547	02	16.05	0.237	10	15.68	0.310	*09*
" .981	15.15	0.617	*20*	15.58	0.129	*08*	16.75	....	..	16.15	0.556	00	15.95	0.246	*03*	15.60	0.319	*08*
" .994	15.18	0.630	*01*	15.8	0.142	..	16.80	....	..	16.18	0.569	03	15.9	0.259	..	15.45	0.332	*09*
1099.717	16.08	0.438	08	15.55	0.104	*06*	16.60	....	..	15.42	0.075	02	15.95	0.267	*06*	15.80	0.151	*06*
" .737	15.98	0.458	*02*	15.50	0.124	*16*	16.55	....	..	15.60	0.095	13	15.80	0.287	*23*	15.95	0.171	03
" .772	15.98	0.493	*02*	15.70	0.159	*09*	16.65	....	..	15.65	0.130	04	15.90	0.322	*15*	16.10	0.206	12

J. D.	No. 25. Per. $0^d.665329$			No. 26. Per. $0^d.402326$			No. 27. Per. not det'd.			No. 28. Per. $0^d.670640$			No. 29. Per. $0^d.574062$			No. 30. Per. $0^d.405976$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		*d.*			*d.*			*d.*			*d.*			*d.*			*d.*	
1099.917	15.20	0.638	05	15.72	0.304	*13*	16.62	....	..	16.00	0.275	04	16.02	0.467	*02*	15.82	0.351	35
1113.627	16.08	0.376	08	15.52	0.335	*08*	16.85	....	..	16.15	0.572	00	16.20	0.400	14	16.00	0.258	00
" .636	15.88	0.385	*12*	15.50	0.344	*02*	16.78	....	..	16.15	0.581	01	15.90	0.409	*16*	16.10	0.267	10
" .683	15.92	0.432	*08*	15.10	0.391	*23*	16.60	....	..	15.28	0.628	*06*	15.55	0.456	*49*	16.05	0.314	32
" .721	15.98	0.470	*02*	15.2	0.027	..	16.80	....	..	15.18	0.666	*01*	15.86	0.494	*10*	15.55	0.352	08
" .763	16.02	0.512	02	15.22	0.069	*25*	16.45	....	..	15.25	0.037	*02*	15.12	0.536	*05*	15.32	0.394	*10*
" .775	16.25	0.524	25	15.32	0.081	*19*	16.65	....	..	15.28	0.049	*03*	15.25	0.548	12	15.45	0.000	03
" .811	15.95	0.560	*04*	15.52	0.117	*11*	16.70	....	..	15.38	0.085	*05*	15.18	0.010	03	15.32	0.036	*13*
" .897	15.15	0.646	02	15.92	0.203	01	16.90	....	..	15.78	0.171	02	15.40	0.096	00	15.75	0.122	01
" .921	15.18	0.005	06	15.95	0.227	01	16.80	....	..	15.88	0.195	05	15.55	0.120	05	15.80	0.146	*03*
" .930	15.20	0.014	06	15.92	0.236	*04*	16.80	....	..	15.82	0.204	*02*	15.82	0.129	27	15.78	0.155	*09*
1128.623	15.15	0.070	*19*	15.3	0.043	..	....	....	..	15.88	0.143	22	15.9	0.470	..	15.9	0.233	..
1132.533	15.10	0.653	*01*	15.75	0.332	11	16.50	....	..	15.30	0.029	06	16.0	0.362	..	15.52	0.083	*08*
" .660	15.22	0.115	*31*	15.38	0.057	*04*	16.7	....	..	15.72	0.156	01	15.8	0.489	..	15.92	0.210	*06*
1133.533	15.78	0.322	*21*	15.6	0.125	..	....	....	..	15.94	0.359	*13*	15.8	0.214	..	15.80	0.271	*19*
" .612	15.85	0.401	*15*	15.9	0.204	..	....	....	..	16.04	0.438	*07*	15.9	0.293	..	15.6	0.350	..
1135.582	16.00	0.375	00	15.8	0.162	..	16.5	....	..	....	....	..	15.2	0.541	..	15.9	0.290	..
" .618	16.00	0.411	00	15.85	0.196	*05*	....	....	..	15.95	0.432	*16*	15.15	0.003	01	15.65	0.326	05
1137.574	15.88	0.371	*12*	15.8	0.187	..	16.9	....	..	16.15	0.376	08	....	....	..	15.9	0.252	..
1139.618	16.03	0.419	03	15.9	0.175	..	16.5	....	..	16.25	0.408	15	15.2	0.552	..	15.8	0.267	..
1163.490	15.82	0.339	*18*	15.80	0.309	*02*	....	....	..	15.82	0.137	18	16.1	0.320	..	15.9	0.186	..
" .548	16.05	0.397	05	....	....	..	16.8	....	..	15.82	0.195	00	15.8	0.378	..	15.95	0.244	*05*
1164.471	14.98	0.655	*12*	15.55	0.084	03	....	....	..	16.15	0.447	03	15.9	0.152	..	15.4	0.355	..

J. D.	No. 31. Per. $0^d.435693$			No. 32. Per. $0^d.605400$			No. 33. Per. not det'd.			No. 34. Per. not det'd.			No. 35. Per. $0^d.383997$			No. 36. Per. $0^d.624142$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		*d.*			*d.*			*d.*			*d.*			*d.*			*d.*	
3770.633	15.55	0.133	*09*	15.85	0.323	*08*	....	....	..	15.02	....	..	15.50	0.033	05	15.25	0.043	*09*
3815.548	15.78	0.172	03	15.80	0.438	*16*	....	....	..	15.00	....	..	15.45	0.020	02	15.48	0.020	22
" .635	16.25	0.259	20	15.72	0.525	*21*	....	....	..	14.85	....	..	15.85	0.107	16	15.3	0.107	..
3833.554	15.90	0.314	*09*	15.75	0.282	*14*	....	....	..	14.65	....	..	15.40	0.362	00	15.2	0.550	..
4086.763	15.5	0.386	..	15.9	0.434	..	....	....	..	14.80	....	..	16.10	0.133	28	16.2	0.357	..
4140.634	15.80	0.231	*18*	15.78	0.424	*19*	....	....	..	15.00	....	..	15.95	0.245	*16*	15.50	0.552	*15*
4200.535	16.05	0.006	73	15.82	0.391	*13*	15.5	....	..	14.72	....	..	16.15	0.242	04	16.45	0.535	22
4210.527	15.21	0.413	*09*	15.30	0.091	*16*	15.6	....	..	14.82	....	..	16.10	0.250	00	16.20	0.541	10
4212.581	15.72	0.288	*35*	15.88	0.329	*05*	....	....	..	14.65	....	..	15.52	0.000	12	15.62	0.098	07
6761.629	15.25	0.097	*28*	15.15	0.038	*09*	....	....	..	14.80	....	..	15.52	0.076	*05*	15.5	0.151	..
6767.536	16.02	0.340	20	15.75	0.496	*23*	....	....	..	14.80	....	..	16.12	0.223	01	16.2	0.440	..
8183.646	15.65	0.012	32	15.20	0.575	*01*	....	....	..	15.00	....	..	16.05	0.152	15	16.1	0.372	..
0724.652	15.50	0.056	07	15.72	0.112	18	16.12	....	..	15.14	....	..	16.02	0.250	*09*	16.30	0.496	04
" .669	15.72	0.073	25	15.62	0.129	02	15.69	....	..	14.88	....	..	15.78	0.267	*16*	16.10	0.513	*16*
" .699	15.55	0.103	*01*	15.80	0.159	12	15.62	....	..	14.80	....	..	15.45	0.297	*09*	15.92	0.543	*08*
" .703	15.68	0.107	12	15.72	0.163	02	15.52	....	..	14.82	....	..	15.33	0.301	*20*	15.65	0.547	*10*
" .733	15.70	0.137	06	15.80	0.193	03	15.58	....	..	14.58	....	..	15.42	0.331	*01*	15.19	0.577	*15*
" .738	15.75	0.142	08	15.80	0.198	01	15.60	....	..	14.88	....	..	15.30	0.336	*13*	15.30	0.582	00
" .764	15.82	0.168	08	15.85	0.224	02	15.70	....	..	14.65	....	..	15.32	0.362	*08*	15.12	0.608	*06*
" .794	15.90	0.198	06	15.88	0.254	02	15.65	....	..	15.08	....	..	15.40	0.008	*01*	15.19	0.014	*05*
" .798	15.82	0.202	*05*	15.88	0.258	01	15.65	....	..	15.01	....	..	15.55	0.012	12	15.35	0.018	10
" .825	15.92	0.229	*04*	16.00	0.285	10	15.8	....	..	15.14	....	..	15.48	0.039	01	15.39	0.045	03
" .839	15.95	0.243	*07*	15.85	0.299	*07*	15.90	....	..	15.05	....	..	15.65	0.053	14	15.41	0.059	00

J. D.	No. 31.	Per. $0^d.435693$		No. 32.	Per. $0^d.605400$		No. 33.	Per. not det'd.		No. 34.	Per. not det'd.		No. 35.	Per. $0^d.383997$		No. 36.	Per. $0^d.624142$	
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		*d.*			*d.*			*d.*			*d.*			*d.*			*d.*	
0724.856	15.92	0.260	*12*	15.78	0.316	*14*	15.73	....	..	14.80	....	..	15.48	0.070	*06*	15.45	0.076	*03*
" .862	16.1	0.266	..	15.68	0.322	*25*	15.6	....	..	14.5	....	..	15.60	0.076	03	15.42	0.082	*09*
" .894	15.82	0.298	*22*	15.92	0.354	*02*	15.36	....	..	15.08	....	..	15.70	0.108	00	15.72	0.114	09
" .911	15.92	0.315	*07*	15.95	0.371	01	15.28	....	..	14.95	....	..	15.70	0.125	*08*	15.75	0.131	07
" .946	15.72	0.350	*01*	15.95	0.406	00	15.12	....	..	14.65	....	..	16.00	0.160	07	15.85	0.166	02
" .982	15.25	0.386	*17*	16.12	0.442	15	15.20	....	..	15.11	....	..	15.90	0.196	*13*	15.85	0.202	*09*
" .987	15.21	0.391	*15*	16.00	0.447	03	15.29	....	..	15.05	....	..	16.12	0.201	07	15.85	0.207	*10*
0725.653	15.78	0.186	*04*	15.88	0.508	*10*	15.40	....	..	15.12	....	..	15.70	0.099	05	16.20	0.249	15
" .677	15.92	0.210	01	15.72	0.532	*15*	15.58	....	..	15.32	....	..	15.58	0.123	*19*	16.00	0.273	*11*
" .711	16.10	0.244	08	15.25	0.566	*05*	15.45	....	..	15.25	....	..	15.78	0.157	*13*	16.35	0.307	18
" .721	15.95	0.254	*09*	15.22	0.576	00	15.62	....	..	15.05	....	..	15.82	0.167	*14*	16.40	0.317	*22*
" .729	16.12	0.262	07	15.15	0.584	*01*	15.65	....	..	15.05	....	..	16.00	0.175	01	16.20	0.325	01
" .792	15.80	0.325	*11*	15.35	0.041	09	15.72	....	..	15.32	....	..	15.95	0.238	*16*	16.12	0.388	*11*
" .812	15.70	0.345	*07*	15.42	0.061	07	15.70	....	..	15.25	....	..	15.75	0.258	*31*	16.15	0.408	*08*
" .821	15.62	0.354	*10*	15.50	0.070	11	16.10	....	..	15.12	....	..	15.82	0.267	*13*	16.35	0.417	11
" .852	15.72	0.385	30	15.58	0.101	07	15.65	....	..	15.14	....	..	15.55	0.298	00	16.11	0.448	*14*
" .857	15.70	0.390	32	15.58	0.106	06	15.60	....	..	15.30	....	..	15.50	0.303	*02*	16.20	0.453	*05*
" .916	15.44	0.013	11	15.70	0.165	*01*	15.74	....	..	15.15	....	..	15.35	0.362	*05*	16.20	0.512	*06*
" .926	15.42	0.023	08	15.75	0.175	02	16.02	....	..	15.1	....	..	15.35	0.372	*05*	16.43	0.522	17
" .937	15.60	0.034	23	15.78	0.186	02	15.90	....	..	15.16	....	..	15.40	0.383	00	16.18	0.533	*06*
" .967	15.8	0.064	..	15.72	0.216	*09*	15.65	....	..	15.0	....	..	15.35	0.029	*09*	15.72	0.563	22
" .972	15.68	0.069	21	15.70	0.221	*13*	15.90	....	..	15.2	....	..	15.38	0.034	*08*	15.55	0.568	10
" .981	15.78	0.078	30	15.80	0.230	*03*	15.8	....	..	15.18	....	..	15.52	0.043	04	15.68	0.577	34
" .994	15.8	0.091	..	16.0	0.243	..	15.8	....	..	15.1	....	..	15.5	0.056	..	15.5	0.590	..
1099.717	15.30	0.425	00	16.05	0.435	08	16.25	....	..	14.75	....	..	15.75	0.150	*15*	16.2	0.452	..
" .737	15.30	0.009	*02*	15.90	0.455	*07*	16.9	....	..	14.6	....	..	16.15	0.170	18	16.48	0.472	*22*
" .772	15.25	0.044	*15*	16.22	0.490	24	16.00	....	..	15.15	....	..	16.10	0.205	04	16.50	0.507	24
" .917	15.72	0.189	*10*	15.20	0.029	02	....	....	..	15.2	....	..	15.45	0.350	04	15.78	0.027	48
1113.627	15.32	0.393	*05*	15.78	0.420	*18*	16.08	....	..	15.08	....	..	15.90	0.236	*21*	15.19	0.006	*03*
" .636	15.35	0.402	03	16.12	0.429	15	16.02	....	..	15.11	....	..	16.12	0.245	01	15.38	0.015	14
" .683	15.35	0.013	02	16.15	0.476	17	15.85	....	..	15.18	....	..	15.52	0.292	*08*	15.44	0.062	01
" .721	15.45	0.051	03	16.25	0.514	28	15.85	....	..	15.18	....	..	15.38	0.330	*06*	15.46	0.100	*10*
" .763	15.58	0.093	05	15.15	0.556	*35*	15.65	....	..	15.15	....	..	15.45	0.372	05	15.75	0.142	02
" .775	15.70	0.103	14	15.12	0.568	*13*	15.80	....	..	15.19	....	..	15.38	0.000	*02*	15.78	0.154	00
" .811	15.80	0.141	13	15.05	0.604	*09*	15.27	....	..	15.1	....	..	15.42	0.036	*05*	16.25	0.190	35
" .897	16.12	0.227	15	15.28	0.085	*15*	15.35	....	..	15.04	....	..	15.80	0.122	03	16.15	0.276	04
" .921	15.98	0.251	*06*	15.58	0.109	05	15.38	....	..	15.12	....	..	15.78	0.146	*10*	16.28	0.300	11
" .930	16.05	0.260	01	15.52	0.118	*04*	16.00	....	..	15.0	....	..	15.90	0.155	*01*	16.30	0.309	12
1128.623	16.10	0.140	43	15.9	0.281	..	....	....	..	15.2	....	..	16.15	0.256	07	....	....	..
1132.533	15.70	0.128	07	15.70	0.559	30	....	....	..	15.1	....	..	15.45	0.327	01	....	....	..
" .660	15.75	0.255	*29*	15.62	0.081	19	....	....	..	15.2	....	..	15.65	0.070	11	....	....	..
1133.533	15.65	0.257	*39*	15.9	0.348	..	15.4	....	..	14.6	....	..	15.95	0.175	*03*	15.6	0.564	..
" .612	15.7	0.336	..	15.9	0.427	..	....	....	..	15.0	....	..	16.18	0.254	10	....	....	..
1135.582	15.48	0.128	*15*	15.35	0.581	17	....	....	..	15.1	....	..	15.8	0.304	..	....	....	..
" .618	15.70	0.164	*04*	15.28	0.012	13	....	....	..	14.5	....	..	15.48	0.340	06	....	....	..
1137.574	15.80	0.377	29	15.4	0.151	..	....	....	..	14.9	....	..	15.28	0.376	*12*	....	....	..
1139.618	16.3	0.242	..	....	....	..	....	....	..	14.6	....	..	15.65	0.116	*09*	....	....	..
1163.490	15.48	0.151	*22*	15.15	0.035	*09*	....	....	..	14.5	....	..	16.02	0.180	01	....	....	..
" .548	15.70	0.209	*20*	15.25	0.093	*22*	....	....	..	15.0	....	..	16.12	0.238	01	....	....	..
1164.471	16.2	0.261	..	16.07	0.411	77	....	....	..	14.3	....	..	15.38	0.009	*04*	....	....	..

J. D.	No. 37.	Per. not det'd.		No. 38.	Per. $0^d.375274$		No. 39.	Per. $0^d.389984$		No. 40.	Per. $0^d.377390$		No. 41.	Per. not det'd.		No. 42.	Per. $0^d.360167$	
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		d.			d.			d.			d.			d.			d.	
3770.633	....	....	..	15.55	0.093	*04*	15.55	0.053	09	15.50	0.360	10	....	....	..	15.32	0.023	*03*
3815.548	....	....	..	15.28	0.350	*06*	15.65	0.120	*02*	15.52	0.366	16	15.78	....	..	15.90	0.278	*04*
" .635	....	....	..	15.48	0.062	02	15.78	0.207	*25*	15.30	0.076	*16*	16.1	....	..	15.45	0.004	11
3833.554	....	....	..	15.20	0.343	*18*	15.75	0.187	*19*	15.90	0.257	*10*	15.40	....	..	15.85	0.275	*10*
4086.763	....	....	..	16.00	0.242	*15*	16.15	0.296	06	16.20	0.238	21	....	....	..	15.92	0.287	08
4140.634	....	....	..	15.52	0.074	02	15.60	0.349	10	16.05	0.142	31	15.35	....	..	16.00	0.132	09
4200.535	....	....	..	15.45	0.306	*25*	16.25	0.193	29	15.35	0.038	*02*	15.90	....	..	16.00	0.246	*05*
4210.527	....	....	..	16.15	0.166	12	15.38	0.045	*05*	15.90	0.218	*07*	....	....	..	16.05	0.153	08
4212.581	....	....	..	15.40	0.343	02	15.75	0.149	*04*	15.30	0.007	*05*	16.02	....	..	15.65	0.046	18
6761.629	....	....	..	15.90	0.155	*07*	15.95	0.262	*19*	16.10	0.163	26	....	....	..	16.05	0.192	*01*
6767.536	....	....	..	15.52	0.058	10	15.40	0.319	*40*	15.75	0.032	39	15.8	....	..	15.45	0.336	00
8183.646	....	....	..	15.70	0.259	*46*	15.45	0.007	10	15.78	0.175	*09*	....	....	..	15.82	0.270	*15*
0724.652	15.82	....	..	16.05	0.285	02	16.25	0.267	11	15.80	0.214	*16*	15.98	....	..	15.78	0.298	04
" .669	15.92	....	..	15.80	0.302	03	16.05	0.284	*08*	16.13	0.231	15	15.95	....	..	15.50	0.315	*06*
" .699	15.70	....	..	15.42	0.332	*03*	16.05	0.314	15	16.00	0.261	00	15.50	....	..	15.38	0.345	*01*
" .703	15.62	....	..	15.40	0.336	*02*	15.90	0.318	05	15.95	0.265	*05*	15.55	....	..	15.45	0.349	08
" .733	15.60	....	..	15.30	0.366	*01*	15.65	0.348	14	16.20	0.295	21	15.30	....	..	15.30	0.019	*04*
" .738	15.60	....	..	15.25	0.371	*05*	15.75	0.353	27	16.00	0.300	01	15.40	....	..	15.50	0.024	14
" .764	15.3	....	..	15.50	0.022	18	15.70	0.379	34	15.90	0.326	*02*	15.35	....	..	15.72	0.050	21
" .794	15.35	....	..	15.40	0.052	01	15.65	0.019	28	15.52	0.356	05	15.58	....	..	15.82	0.080	12
" .798	15.40	....	..	15.45	0.056	03	15.52	0.023	14	15.42	0.360	00	15.53	....	..	15.65	0.084	*07*
" .825	15.45	....	..	15.58	0.083	04	15.50	0.050	05	15.35	0.009	01	15.58	....	..	15.88	0.111	06
" .839	15.48	....	..	15.70	0.097	09	15.70	0.064	19	15.35	0.023	00	15.60	....	..	15.88	0.125	*01*
" .856	15.65	....	..	15.65	0.114	*07*	15.55	0.081	01	15.50	0.040	13	15.85	....	..	15.88	0.142	*07*
" .862	15.6	....	..	15.58	0.120	*17*	15.40	0.087	*15*	15.38	0.046	00	15.80	....	..	15.90	0.148	*05*
" .894	15.80	....	..	16.10	0.152	14	15.68	0.119	01	15.45	0.078	*02*	15.90	....	..	16.10	0.180	06
" .911	15.75	....	..	16.15	0.169	12	15.85	0.136	13	15.52	0.095	00	15.90	....	..	16.05	0.197	01
" .946	16.0	....	..	16.10	0.204	*03*	15.58	0.171	*29*	15.50	0.130	*19*	15.90	....	..	15.98	0.232	*08*
" .982	16.05	....	..	16.00	0.240	*15*	15.68	0.207	*35*	15.72	0.166	*12*	15.95	....	..	15.95	0.268	*04*
" .987	15.90	....	..	16.20	0.245	04	15.95	0.212	*09*	15.90	0.171	04	16.00	....	..	16.05	0.273	08
0725.653	15.45	....	..	16.20	0.160	20	15.58	0.098	*02*	15.45	0.083	*04*	15.85	....	..	15.90	0.218	*17*
" .677	15.45	....	..	16.22	0.184	13	15.45	0.122	*23*	15.52	0.107	*05*	15.80	....	..	16.10	0.242	04
" .711	15.42	....	..	16.15	0.218	12	15.70	0.156	*12*	15.52	0.141	*21*	15.75	....	..	16.00	0.276	05
" .721	15.50	....	..	16.25	0.228	10	15.90	0.166	05	15.58	0.151	*19*	16.05	....	..	15.82	0.286	*04*
" .729	15.50	....	..	16.00	0.236	*15*	15.70	0.174	*19*	15.60	0.159	*21*	15.90	....	..	15.72	0.294	*03*
" .792	15.68	....	..	15.65	0.299	*17*	16.20	0.237	09	15.95	0.222	*02*	16.20	....	..	15.58	0.357	23
" .812	15.60	....	..	15.48	0.319	*09*	16.05	0.257	*09*	15.75	0.242	*24*	16.00	....	..	15.30	0.017	*04*
" .821	15.60	....	..	15.60	0.328	12	16.25	0.266	11	15.92	0.251	*08*	16.15	....	..	15.50	0.026	13
" .852	15.80	....	..	15.38	0.359	05	15.95	0.297	*14*	16.00	0.282	00	16.02	....	..	15.58	0.057	04
" .857	15.60	....	..	15.35	0.364	04	16.15	0.302	09	16.05	0.287	06	15.90	....	..	15.45	0.062	*13*
" .916	15.35	....	..	15.48	0.048	10	15.45	0.361	04	15.42	0.346	*20*	15.82	....	..	15.82	0.121	*05*
" .926	15.65	....	..	15.58	0.058	16	15.50	0.371	14	15.32	0.356	*13*	15.92	....	..	15.82	0.131	*09*
" .937	15.35	....	..	15.45	0.069	*03*	15.28	0.382	*07*	15.35	0.367	*03*	15.82	....	..	15.88	0.142	*06*
" .967	15.30	....	..	15.65	0.099	03	15.32	0.022	*06*	15.35	0.019	00	15.40	....	..	15.98	0.172	*05*
" .972	15.3	....	..	15.65	0.104	00	15.32	0.027	*07*	15.40	0.024	05	15.75	....	..	16.12	0.177	08
" .981	15.50	....	..	15.75	0.113	05	15.35	0.036	*07*	15.45	0.033	09	15.87	....	..	15.98	0.186	*08*
" .994	16.0	....	..	15.65	0.126	*13*	15.4	0.049	..	15.25	0.046	*13*	15.75	....	..	16.10	0.199	03
1099.717	15.45	....	..	15.55	0.076	05	15.95	0.168	08	15.95	0.153	15	15.83	....	..	15.68	0.069	06
" .737	15.3	....	..	15.88	0.096	26	15.95	0.188	*03*	15.90	0.173	03	15.93	....	..	15.78	0.089	04
" .772	15.70	....	..	15.75	0.131	*08*	16.10	0.223	02	16.20	0.208	25	15.90	....	..	15.88	0.124	*01*

J. D.	No. 37. Per. not det'd.			No. 38. Per. $0^d.375274$			No. 39. Per. $0^d.389984$			No. 40. Per. $0^d.377390$			No. 41. Per. not det'd.			No. 42. Per. $0^d.360167$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		*d.*			*d.*			*d.*			*d.*			*d.*			*d.*	
1099.917	15.3	....	..	16.15	0.276	03	15.40	0.368	02	15.45	0.353	*02*	16.3	....	..	15.82	0.269	*16*
1113.627	16.05	....	..	15.60	0.101	*03*	15.38	0.038	*04*	15.65	0.100	12	16.20	....	..	15.80	0.292	02
" .636	16.00	....	..	15.85	0.110	15	15.60	0.047	16	15.70	0.109	13	16.17	....	..	15.62	0.301	*08*
" .683	16.20	....	..	16.10	0.157	12	15.85	0.094	27	15.70	0.156	*10*	16.10	....	..	15.28	0.348	*11*
" .721	15.65	....	..	16.35	0.195	23	15.82	0.132	09	15.90	0.194	*03*	15.90	....	..	15.40	0.026	04
" .763	15.50	....	..	16.15	0.237	00	16.15	0.174	26	16.10	0.236	11	15.80	....	..	15.65	0.068	04
" .775	15.40	....	..	16.27	0.249	11	16.20	0.186	27	15.90	0.248	*09*	15.80	....	..	15.72	0.080	02
" .811	15.45	....	..	16.22	0.285	20	16.25	0.222	17	15.55	0.284	*44*	15.68	....	..	15.80	0.116	*05*
" .897	15.80	....	..	15.28	0.371	*02*	15.90	0.308	*05*	15.22	0.370	*14*	16.02	....	..	16.12	0.202	05
" .921	15.62	....	..	15.38	0.019	07	15.75	0.332	09	15.40	0.016	05	15.90	....	..	16.10	0.226	03
" .930	15.68	....	..	15.45	0.028	12	15.75	0.341	18	15.55	0.025	20	16.05	....	..	15.98	0.235	*09*
1128.623	....	....	..	15.78	0.086	20	16.25	0.215	20	15.45	0.000	11	16.1	....	..	16.00	0.161	00
1132.533	15.3	....	..	16.10	0.243	*05*	16.20	0.225	12	16.15	0.136	43	15.9	....	..	15.80	0.110	*02*
" .660	....	....	..	15.35	0.370	05	15.70	0.352	22	15.80	0.263	*20*	15.8	....	..	16.05	0.237	*01*
1133.533	....	....	..	15.65	0.117	*07*	15.65	0.055	19	15.25	0.004	*09*	15.9	....	..	15.35	0.029	*01*
" .612	....	....	..	15.92	0.196	*19*	15.82	0.134	10	15.95	0.083	46	15.9	....	..	15.70	0.108	*12*
1135.582	....	....	..	15.75	0.289	*23*	15.95	0.154	13	16.0	0.166	..	16.0	....	..	15.85	0.277	*09*
" .618	....	....	..	15.40	0.325	*11*	16.10	0.190	15	15.75	0.202	*19*	16.3	....	..	15.55	0.313	*05*
1137.574	....	....	..	15.50	0.030	17	15.80	0.196	*18*	15.55	0.271	*45*	15.9	....	..	15.90	0.108	09
1139.618	....	....	..	16.20	0.198	09	15.75	0.290	*37*	15.70	0.051	30	15.8	....	..	15.25	0.351	*11*
1163.490	....	....	..	15.35	0.052	*04*	15.52	0.373	15	15.85	0.147	10	15.8	....	..	15.75	0.092	*01*
" .548	....	....	..	15.90	0.110	20	15.90	0.041	47	16.05	0.205	10	15.9	....	..	15.90	0.150	*06*
1164.471	....	....	..	15.90	0.282	*15*	16.10	0.184	17	15.18	0.373	*18*	15.9	....	..	15.15	0.353	*21*

J. D.	No. 43. Per. $0^d.406744$			No. 44. Per. $0^d.595568$			No. 45. Per. $0^d.66210$			No. 46. Per. $0^d.692730$			No. 47. Per. $0^d.662900$			No. 48. Per. $0^d.378881$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		*d.*			*d.*			*d.*			*d.*			*d.*			*d.*	
3770.633	15.8	0.330	..	15.70	0.549	*05*	15.60	....	..	....	....	..	....	....	..	....	....	..
3815.548	15.38	0.096	*10*	16.05	0.200	13	15.70	....	..	....	....	..	....	....	..	....	....	..
" .635	15.95	0.183	12	15.85	0.287	*19*	15.5	....	..	....	....	..	....	....	..	....	....	..
3833.554	15.85	0.205	*01*	15.72	0.339	*35*	15.72	....	..	....	....	..	....	....	..	....	....	..
4086.763	15.22	0.013	*03*	15.90	0.432	*21*	16.1	....	..	....	....	..	....	....	..	....	....	..
4140.634	15.5	0.194	..	15.65	0.106	03	15.3	....	..	....	....	..	15.2	0.024	..	....	....	..
4200.535	15.75	0.304	*13*	16.05	0.450	*06*	16.05	....	..	15.7	0.211	..	15.9	0.264	..	15.78	0.304	*07*
4210.527	15.88	0.127	25	16.08	0.318	02	16.05	....	..	....	....	..	16.4	0.313	..	15.40	0.066	*18*
4212.581	15.65	0.147	*09*	15.45	0.586	24	16.05	....	..	....	....	..	16.2	0.378	..	16.00	0.226	*14*
6761.629	15.9	0.130	..	15.35	0.007	13	15.8	....	..	....	....	..	....	....	..	....	....	..
6767.536	15.75	0.343	05	15.35	0.554	*15*	15.20	....	..	....	....	..	....	....	..	....	....	..
8183.646	15.88	0.170	07	15.8	0.403	..	16.20	....	..	....	....	..	....	....	..	....	....	..
0724.652	15.88	0.247	00	15.72	0.120	05	16.25	0.464	11	15.80	0.196	*12*	15.72	0.119	11	15.78	0.090	08
" .669	15.85	0.264	*03*	15.70	0.137	*02*	16.08	0.481	*06*	15.88	0.213	*07*	15.75	0.136	11	15.75	0.107	*02*
" .699	16.02	0.294	14	15.62	0.167	*20*	16.00	0.511	14	15.98	0.243	*04*	15.52	0.166	*19*	15.72	0.137	*16*
" .703	15.78	0.298	*10*	15.75	0.171	*08*	16.02	0.515	*12*	16.08	0.247	05	15.62	0.170	*10*	15.90	0.141	*01*
" .733	15.85	0.328	07	15.78	0.201	*14*	16.15	0.545	01	15.98	0.277	*11*	15.68	0.200	*10*	16.00	0.171	01
" .738	15.57	0.333	*20*	15.82	0.206	*10*	16.15	0.550	01	16.20	0.282	09	15.82	0.205	03	15.92	0.176	*09*
" .764	15.45	0.359	*04*	15.78	0.232	*20*	16.10	0.576	*02*	16.25	0.308	11	15.75	0.231	*09*	16.00	0.202	*09*
" .794	15.28	0.389	03	16.08	0.262	06	15.85	0.606	*10*	16.12	0.338	*08*	15.82	0.261	*08*	16.30	0.232	15
" .798	15.22	0.393	*03*	16.15	0.266	13	15.88	0.610	*03*	16.25	0.342	03	15.88	0.265	*03*	16.25	0.236	08
" .825	15.35	0.013	10	16.08	0.293	03	15.18	0.637	*15*	16.28	0.369	01	15.98	0.292	03	16.25	0.263	08
" .839	15.40	0.027	13	16.00	0.307	*06*	15.18	0.651	*02*	16.20	0.383	*10*	15.98	0.306	01	16.20	0.277	13

J. D.	No. 43. Per. $0^d.406744$			No. 44. Per. $0^d.595568$			No. 45. Per. $0^d.66210$			No. 46. Per. $0^d.692730$			No. 47. Per. $0^d.662900$			No. 48. Per. $0^d.378881$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		*d.*			*d.*			*d.*			*d.*			*d.*			*d.*	
0724.856	15.48	0.044	17	15.95	0.324	*12*	15.22	0.006	02	16.30	0.400	*01*	15.92	0.323	*08*	15.95	0.294	02
" .862	15.45	0.050	13	15.85	0.330	*32*	15.10	0.012	*12*	16.4	0.406	..	15.9	0.329	..	15.80	0.300	*08*
" .894	15.65	0.082	23	16.08	0.362	00	15.35	0.044	03	16.32	0.438	00	15.92	0.361	*09*	15.75	0.332	10
" .911	15.48	0.099	*02*	16.15	0.379	06	15.55	0.061	13	16.35	0.455	03	16.12	0.378	10	15.65	0.349	12
" .946	15.58	0.134	*09*	15.95	0.414	*15*	15.40	0.096	*21*	16.20	0.490	*12*	....	....	..	15.38	0.005	03
" .982	15.88	0.170	07	16.02	0.450	*09*	15.75	0.132	*01*	16.25	0.526	*07*	16.00	0.449	*03*	15.60	0.041	15
" .987	15.88	0.175	06	15.92	0.455	*19*	15.80	0.137	02	16.19	0.531	*13*	16.10	0.454	07	15.45	0.046	*02*
0725.653	15.28	0.027	01	16.05	0.526	*02*	15.75	0.141	*04*	16.35	0.505	03	15.98	0.457	*05*	15.68	0.333	02
" .677	15.48	0.051	15	15.68	0.550	*07*	15.65	0.165	*22*	16.30	0.529	*02*	15.80	0.481	*24*	15.58	0.357	12
" .711	15.40	0.085	*02*	15.15	0.584	*06*	15.75	0.199	*19*	16.25	0.563	*07*	16.05	0.515	01	15.58	0.012	21
" .721	15.45	0.095	*02*	15.42	0.594	22	16.00	0.209	04	16.35	0.573	06	16.22	0.525	18	15.63	0.022	23
" .729	15.58	0.103	07	15.18	0.006	*04*	15.88	0.217	*10*	16.12	0.581	*13*	15.92	0.533	*11*	15.60	0.030	18
" .792	15.78	0.166	*01*	15.32	0.069	*15*	16.02	0.280	*05*	15.38	0.644	*12*	15.32	0.596	*10*	15.70	0.093	00
" .812	15.90	0.186	06	15.65	0.089	11	16.22	0.300	12	15.35	0.664	*06*	15.15	0.616	*18*	15.75	0.113	*04*
" .821	15.78	0.195	*08*	15.82	0.098	24	16.40	0.309	30	15.68	0.673	28	15.52	0.625	20	15.92	0.122	09
" .852	16.00	0.226	13	15.68	0.129	*01*	16.15	0.340	03	15.45	0.011	01	15.45	0.656	13	16.05	0.153	11
" .857	15.95	0.231	07	15.62	0.134	*09*	16.20	0.345	07	15.37	0.016	*08*	15.48	0.661	16	16.13	0.158	18
" .916	15.85	0.290	*03*	15.88	0.193	*01*	16.15	0.404	01	15.62	0.075	00	15.45	0.057	02	16.02	0.217	*11*
" .926	15.48	0.300	*39*	16.05	0.203	13	16.20	0.414	06	15.98	0.085	33	16.0	0.067	..	16.15	0.227	00
" .937	15.55	0.311	*31*	15.98	0.214	04	16.15	0.425	01	15.79	0.096	12	15.48	0.078	*02*	16.12	0.238	04
" .967	15.60	0.341	*10*	15.88	0.244	*11*	16.12	0.455	*02*	15.75	0.126	00	15.5	0.108	..	15.92	0.268	*22*
" .972	15.37	0.346	*29*	16.05	0.249	05	16.25	0.460	11	15.9	0.131	..	15.65	0.113	06	16.0	0.273	..
" .981	15.40	0.355	*15*	16.02	0.258	01	16.20	0.469	06	16.0	0.140	..	15.75	0.122	13	15.9	0.282	..
" .994	15.25	0.368	*11*	16.00	0.271	*03*	16.1	0.482	..	15.9	0.153	..	15.6	0.135	..	15.7	0.295	..
1099.717	15.88	0.294	00	15.12	0.573	*15*	16.10	0.118	39	16.38	0.494	05	....	....	..	15.80	0.063	23
" .737	15.80	0.314	*06*	15.40	0.593	20	16.00	0.138	22	16.1	0.514	..	....	....	..	15.7	0.083	..
" .772	15.80	0.349	17	15.20	0.032	*12*	16.05	0.173	16	16.30	0.549	*02*	15.68	0.038	28	15.72	0.118	*09*
" .917	15.30	0.087	*13*	15.90	0.177	06	16.25	0.318	15	15.5	0.002	..	....	....	..	15.8	0.263	..
1113.627	15.88	0.375	58	15.98	0.189	10	15.95	0.124	22	16.26	0.550	*06*	15.25	0.635	*07*	15.65	0.333	00
" .636	15.52	0.384	27	15.88	0.198	*02*	15.80	0.133	03	16.60	0.559	28	15.40	0.644	08	15.65	0.342	07
" .683	15.00	0.024	*26*	16.08	0.245	09	15.82	0.180	*08*	15.90	0.606	*05*	15.45	0.028	07	15.68	0.010	32
" .721	15.22	0.062	*13*	16.15	0.283	11	15.68	0.218	*30*	15.75	0.644	26	15.50	0.066	04	15.85	0.048	36
" .763	15.18	0.104	*34*	16.25	0.325	18	15.82	0.260	*22*	15.42	0.686	02	15.80	0.108	*22*	15.88	0.090	18
" .775	15.22	0.116	*35*	16.30	0.337	22	15.90	0.272	*16*	15.55	0.005	13	15.62	0.120	01	15.90	0.102	14
" .811	15.35	0.152	*41*	16.30	0.373	21	15.98	0.308	*12*	15.70	0.041	17	15.92	0.156	23	15.90	0.138	00
" .897	15.90	0.238	02	16.08	0.459	*03*	15.90	0.394	*23*	15.82	0.127	07	15.90	0.242	03	16.22	0.224	08
" .921	15.95	0.262	07	15.98	0.483	*13*	16.00	0.418	*14*	15.70	0.151	*11*	15.72	0.266	*19*	16.18	0.248	01
" .930	15.88	0.271	00	16.08	0.492	*03*	16.20	0.427	06	15.92	0.160	09	16.00	0.275	07	16.18	0.257	01
1128.623	15.65	0.321	*17*	16.1	0.296	..	15.9	0.554	..	....	....	..	....	....	..	....	....	..
1132.533	15.80	0.163	01	15.6	0.037	..	16.2	0.491	..	....	....	..	....	....	..	....	....	..
" .660	15.32	0.290	*56*	15.9	0.164	..	15.85	0.618	05	....	....	..	....	....	..	15.2	0.043	..
1133.533	15.20	0.350	*42*	16.15	0.441	04	16.10	0.167	23	....	....	..	15.4	0.654	..	....	....	..
" .612	15.40	0.022	15	16.15	0.520	07	16.0	0.246	..	....	....	..	....	....	..	....	....	..
1135.582	15.27	0.365	*15*	15.75	0.108	13	15.9	0.230	..	....	....	..	....	....	..	....	....	..
" .618	15.80	0.401	55	15.65	0.144	*10*	16.0	0.266	..	....	....	..	....	....	..	....	....	..
1137.574	15.50	0.324	*29*	16.1	0.313	..	16.1	0.236	..	....	....	..	....	....	..	....	....	..
1139.618	15.48	0.334	*28*	15.05	0.571	*23*	....	....	..	....	....	..	....	....	..	....	....	..
1163.490	15.85	0.208	*02*	15.45	0.024	16	16.10	0.330	*01*	....	....	..	....	....	..	....	....	..
" .548	15.35	0.266	*53*	15.7	0.082	..	16.2	0.388	..	....	....	..	....	....	..	....	....	..
1164.471	15.20	0.376	*08*	15.9	0.410	..	15.2	0.649	..	....	....	..	....	....	..	15.3	0.028	..

J. D.	No. 49. Per. $0^d.417072$			No. 50. Per. $0^d.29850$			No. 51. Per. $0^d.397757$			No. 52. Per. $0^d.575608$			No. 53. Per. $0^d.414135$			No. 54. Per. $0^d.398325$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		*d.*			*d.*			*d.*			*d.*			*d.*			*d.*	
3770.633	15.27	0.168	*01*	....	....	..	15.48	0.023	*08*	16.05	0.323	*13*	15.3	0.020	..	15.65	0.133	*17*
3815.548	15.32	0.360	*01*	15.9	....	..	15.50	0.389	*01*	16.20	0.341	01	15.95	0.208	07	15.35	0.037	*25*
" .635	15.26	0.029	45	16.2	....	..	15.55	0.078	*17*	16.15	0.428	*08*	15.95	0.295	06	15.58	0.124	*21*
3833.554	15.02	0.393	18	15.5	....	..	15.55	0.098	*22*	16.25	0.503	01	15.22	0.406	*06*	15.48	0.119	*30*
4086.763	15.32	0.311	*03*	15.5	....	..	15.9	0.334	..	16.10	0.444	*14*	15.5	0.165	..	15.4	0.391	..
4140.634	15.32	0.264	*03*	15.3	....	..	15.48	0.110	*34*	16.00	0.208	*03*	15.70	0.198	*16*	15.72	0.090	03
4200.535	....	....	..	15.45	....	..	15.42	0.348	*14*	16.02	0.246	*06*	15.35	0.049	01	16.05	0.242	*07*
4210.527	15.16	0.355	*18*	16.05	....	..	15.52	0.396	01	16.22	0.453	*02*	15.42	0.102	*14*	16.00	0.276	*13*
4212.581	15.27	0.320	*08*	16.08	....	..	15.68	0.063	02	15.98	0.204	*04*	15.52	0.086	04	15.52	0.339	*21*
6761.629	15.36	0.156	09	16.2	....	..	15.6	0.284	..	16.10	0.460	*14*	15.5	0.133	..	15.65	0.107	*09*
6767.536	15.37	0.212	07	....	....	..	16.05	0.225	02	15.18	0.035	*08*	15.75	0.242	*15*	15.42	0.039	*18*
8183.646	15.12	0.217	*20*	....	....	..	15.52	0.320	*16*	15.80	0.149	*07*	15.5	0.010	..	15.35	0.103	*38*
0724.652	14.64	0.387	*26*	15.78	0.249	01	15.92	0.056	28	16.10	0.422	*13*	15.95	0.298	07	16.02	0.194	*03*
" .669	14.79	0.404	02	15.45	0.258	*18*	15.57	0.073	*12*	16.18	0.439	*06*	16.05	0.315	23	16.15	0.211	06
" .699	14.74	0.016	*03*	15.35	0.296	*01*	15.68	0.103	*11*	16.30	0.469	06	15.58	0.345	*05*	16.10	0.241	*02*
" .703	14.79	0.020	01	15.60	0.001	25	15.72	0.107	*08*	16.25	0.473	01	15.45	0.349	*15*	16.08	0.245	*04*
" .733	14.84	0.050	*04*	15.58	0.031	12	15.80	0.137	*08*	16.25	0.503	01	15.35	0.379	*01*	15.80	0.275	*33*
" .738	14.89	0.055	*02*	15.50	0.036	01	15.85	0.142	*04*	16.22	0.508	02	15.30	0.384	*03*	16.05	0.280	*07*
" .764	14.89	0.081	*12*	15.82	0.062	15	15.80	0.168	*14*	15.40	0.534	00	15.25	0.410	*03*	15.62	0.306	*42*
" .794	15.19	0.111	05	15.88	0.092	05	16.15	0.198	15	15.12	0.564	00	15.22	0.026	*08*	15.78	0.336	01
" .798	15.21	0.115	04	15.82	0.096	*02*	16.08	0.202	07	15.12	0.568	00	15.22	0.030	*10*	15.70	0.340	*03*
" .825	14.98	0.142	*26*	15.95	0.123	02	16.20	0.229	17	15.15	0.019	*03*	15.30	0.057	*06*	15.68	0.367	05
" .839	15.26	0.156	00	15.95	0.137	01	16.18	0.243	15	15.15	0.033	*08*	15.38	0.071	*04*	15.68	0.381	07
" .856	15.29	0.173	00	16.00	0.154	03	15.98	0.260	*05*	15.60	0.050	26	15.28	0.088	*21*	15.72	0.398	12
" .862	15.11	0.179	*19*	16.18	0.160	20	15.78	0.266	*25*	15.35	0.056	*03*	15.30	0.094	*23*	15.57	0.006	*02*
" .894	15.29	0.211	*02*	15.98	0.192	*01*	15.82	0.298	*08*	15.75	0.088	14	15.65	0.126	*01*	15.68	0.038	07
" .911	15.42	0.228	10	16.05	0.209	05	15.63	0.315	*10*	15.75	0.105	06	15.78	0.143	06	15.85	0.055	22
" .946	15.34	0.263	00	15.85	0.244	03	15.52	0.350	*03*	15.90	0.140	07	15.82	0.178	01	15.75	0.090	06
" .982	15.24	0.299	*11*	15.32	0.280	*10*	15.50	0.386	*01*	15.98	0.176	04	15.90	0.214	02	15.72	0.126	*07*
" .987	15.30	0.304	*05*	15.55	0.285	17	15.42	0.391	*09*	15.88	0.181	*07*	15.75	0.219	*14*	15.88	0.131	07
0725.653	15.29	0.134	06	15.82	0.056	19	16.15	0.262	12	16.20	0.272	07	15.58	0.056	22	15.52	0.000	*06*
" .677	15.29	0.158	02	15.82	0.080	05	15.98	0.286	00	16.22	0.296	06	15.55	0.080	10	15.65	0.024	06
" .711	15.24	0.192	*06*	15.98	0.114	08	15.85	0.320	15	16.35	0.330	17	15.75	0.114	13	15.75	0.058	13
" .721	15.29	0.202	*02*	15.95	0.124	03	15.88	0.330	25	16.30	0.340	11	15.70	0.124	05	15.98	0.068	34
" .729	15.26	0.210	*05*	15.92	0.132	*02*	15.58	0.338	*01*	16.40	0.348	20	15.70	0.132	02	15.50	0.076	*14*
" .792	15.30	0.273	*04*	15.92	0.195	*08*	15.58	0.003	06	16.22	0.411	00	15.70	0.195	*15*	15.82	0.139	*01*
" .812	15.29	0.293	*06*	15.95	0.215	*04*	15.50	0.023	*06*	16.22	0.431	*01*	15.82	0.215	*06*	15.95	0.159	03
" .821	15.46	0.302	11	15.90	0.224	*05*	15.75	0.032	17	16.25	0.440	01	15.85	0.224	*05*	16.25	0.168	28
" .852	15.30	0.333	*05*	15.68	0.255	*02*	15.65	0.063	*02*	16.22	0.471	*02*	15.82	0.255	*09*	16.05	0.199	*01*
" .857	15.34	0.338	*01*	15.55	0.260	*07*	15.70	0.068	02	16.22	0.476	*02*	15.55	0.260	*36*	16.10	0.204	02
" .916	14.79	0.397	*04*	15.45	0.020	08	15.72	0.127	*12*	15.25	0.535	*15*	15.52	0.319	*29*	16.05	0.263	*08*
" .926	14.84	0.407	08	15.82	0.030	36	15.88	0.137	00	15.15	0.545	*05*	15.55	0.329	*20*	16.35	0.273	22
" .937	14.74	0.418	*01*	15.70	0.041	16	15.78	0.148	*13*	15.10	0.556	*03*	15.38	0.340	*28*	16.05	0.284	*07*
" .967	14.84	0.030	03	15.85	0.071	13	15.75	0.178	*22*	15.12	0.010	*01*	15.32	0.370	*09*	15.80	0.314	*16*
" .972	14.79	0.035	*04*	15.88	0.076	14	15.9	0.183	..	15.18	0.015	02	15.28	0.375	*09*	15.80	0.319	*14*
" .981	14.98	0.044	12	15.98	0.085	19	15.80	0.192	*19*	15.25	0.024	05	15.28	0.384	*05*	15.85	0.328	00
" .994	14.79	0.057	*13*	15.75	0.099	*10*	16.00	0.205	*01*	15.45	0.037	18	15.35	0.397	07	15.75	0.341	04
1099.717	15.29	0.113	14	15.85	0.099	00	15.43	0.037	*15*	16.05	0.190	07	15.75	0.156	*01*	15.60	0.037	00
" .737	15.29	0.133	07	15.82	0.119	*10*	15.55	0.057	*09*	16.05	0.210	02	15.85	0.176	04	15.55	0.057	*07*
" .772	15.30	0.168	02	15.92	0.154	*05*	15.75	0.092	00	16.03	0.245	*05*	15.90	0.211	02	16.02	0.092	*32*

J. D.	No. 49. Per. $0^d.417972$			No. 50. Per. $0^d.29850$			No. 51. Per. $0^d.397757$			No. 52. Per. $0^d.575608$			No. 53. Per. $0^d.414135$			No. 54. Per. $0^d.398325$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		*d.*			*d.*			*d.*			*d.*			*d.*			*d.*	
1099.917	15.21	0.313	*14*	15.70	0.299	35	15.98	0.237	*05*	16.18	0.390	*04*	15.75	0.356	24	16.18	0.237	06
1113.627	15.30	0.230	*04*	15.65	0.278	21	15.68	0.025	12	16.22	0.286	07	15.30	0.400	01	15.55	0.006	*04*
" .636	15.46	0.239	12	15.65	0.287	28	15.78	0.034	20	16.30	0.295	14	15.20	0.409	*08*	15.75	0.015	16
" .683	15.29	0.286	*06*	15.75	0.036	25	16.10	0.081	37	16.25	0.342	06	15.40	0.042	07	15.70	0.062	07
" .721	15.40	0.324	05	15.70	0.074	*03*	16.22	0.119	39	16.30	0.380	08	15.40	0.080	*05*	15.88	0.100	15
" .763	15.21	0.366	*10*	15.92	0.116	02	16.02	0.161	09	16.15	0.422	*08*	15.82	0.122	17	16.05	0.142	20
" .775	15.29	0.378	05	15.90	0.128	*02*	16.25	0.173	29	16.12	0.434	*12*	15.82	0.134	12	15.88	0.154	*02*
" .811	14.98	0.414	23	15.95	0.164	*03*	15.98	0.209	*03*	16.08	0.470	*16*	15.72	0.170	*08*	16.10	0.190	06
" .897	14.96	0.082	*05*	15.95	0.250	19	15.65	0.295	*27*	15.12	0.556	*01*	15.75	0.256	*16*	16.15	0.276	02
" .921	15.22	0.106	10	15.60	0.274	15	15.52	0.319	*17*	15.18	0.004	06	15.90	0.280	*01*	16.12	0.300	05
" .930	15.22	0.115	05	15.70	0.283	30	15.70	0.328	06	15.25	0.013	10	15.90	0.289	00	16.05	0.309	03
1128.623	15.32	0.179	03	15.6	0.051	..	15.9	0.304	..	15.98	0.316	*20*	15.32	0.073	*10*	15.9	0.264	..
1132.533	15.27	0.327	*08*	15.75	0.081	*01*	15.95	0.236	*08*	16.08	0.197	09	15.90	0.256	*01*	15.80	0.190	*24*
" .660	....	....	..	....	....	..	15.9	0.363	..	16.05	0.324	*13*	15.50	0.383	16	....	....	..
1133.533	14.69	0.073	*28*	15.9	0.185	..	15.6	0.043	..	15.25	0.045	*05*	15.20	0.013	*09*	15.8	0.393	..
" .612	15.08	0.152	*18*	15.2	0.264	..	15.8	0.122	..	15.88	0.124	11	15.80	0.092	28	....	....	..
1135.582	14.89	0.032	07	15.8	0.144	..	15.9	0.103	..	16.15	0.368	*05*	15.68	0.406	40	15.6	0.053	..
" .618	15.00	0.068	04	16.02	0.180	04	16.05	0.139	17	16.25	0.404	03	15.55	0.028	25	15.60	0.089	*07*
1137.574	15.19	0.353	*15*	15.6	0.047	..	....	....	..	15.30	0.057	*10*	15.85	0.327	09	....	....	..
1139.618	15.32	0.307	*03*	15.2	0.002	..	....	....	..	16.15	0.374	*07*	16.1	0.301	..	....	....	..
1163.490	15.43	0.354	09	15.50	0.292	14	15.5	0.168	..	15.55	0.071	06	16.00	0.153	25	....	....	..
" .548	....	....	..	15.6	0.052	..	15.9	0.226	..	15.92	0.129	13	15.95	0.211	08	15.6	0.136	..
1164.471	15.26	0.081	25	....	....	..	....	....	..	16.05	0.476	*19*	15.8	0.305	..	....	....	..

J. D.	No. 55. Per. $0^d.719615$			No. 56. Per. $0^d.570307$			No. 57. Per. $0^d.348935$			No. 58. Per. $0^d.420463$			No. 59. Per. $0^d.565260$			No. 60. Per. $0^d.691852$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		*d.*			*d.*			*d.*			*d.*			*d.*			*d.*	
3770.633	....	....	..	....	....	..	15.4	0.322	..	....	....	..	....	....	..	....	....	..
3815.548	15.5	0.668	..	15.6	0.498	..	15.6	0.224	..	15.65	0.048	*10*	....	....	..	....	....	..
" .635	15.3	0.035	..	15.1	0.015	..	15.3	0.311	..	16.0	0.135	..	....	....	..	....	....	..
3833.554	15.4	0.684	..	....	....	..	15.1	0.086	..	....	....	..	....	....	..	....	....	..
4086.763	....	....	..	....	....	..	15.3	0.317	..	....	....	..	....	....	..	....	....	..
4140.634	15.9	0.488	..	16.0	0.509	..	....	....	..	15.8	0.116	..	....	....	..	16.0	0.244	..
4200.535	15.95	0.661	03	15.5	0.528	..	15.35	0.336	07	16.55	0.311	28	....	....	..	....	....	..
4210.527	16.20	0.578	*10*	16.0	0.255	..	15.82	0.209	*15*	16.00	0.212	*25*	15.7	0.558	..	....	....	..
4212.581	15.98	0.473	*30*	15.2	0.027	..	15.55	0.169	*38*	16.00	0.164	*15*	....	....	..	....	....	..
6761.629	....	....	..	16.1	0.373	..	....	....	..	....	....	..	....	....	..	....	....	..
6767.536	15.4	0.075	..	15.1	0.007	..	....	....	..	....	....	..	....	....	..	....	....	..
8183.646	....	....	..	....	....	..	15.2	0.005	..	....	....	..	....	....	..	15.2	0.073	..
0724.652	15.78	0.028	25	16.05	0.333	*05*	15.85	0.066	30	15.82	0.104	*11*	15.65	0.062	01	15.65	0.598	*19*
" .669	15.75	0.045	18	16.15	0.350	05	15.68	0.083	05	15.85	0.121	*15*	15.60	0.079	*08*	15.52	0.615	*03*
" .699	15.72	0.075	09	16.05	0.380	*06*	15.71	0.113	*03*	15.88	0.151	*24*	15.67	0.109	*10*	15.34	0.645	00
" .703	15.72	0.079	08	15.90	0.384	*20*	15.65	0.117	*11*	15.98	0.155	*15*	15.62	0.113	*17*	15.18	0.649	*15*
" .733	15.68	0.109	*03*	15.75	0.414	*36*	15.92	0.147	05	15.98	0.185	*22*	15.9	0.143	..	15.30	0.679	01
" .738	15.73	0.114	01	15.85	0.419	*26*	15.98	0.152	08	16.15	0.190	*07*	15.68	0.148	*18*	15.30	0.684	01
" .764	15.75	0.140	*03*	15.85	0.445	*25*	15.88	0.178	*07*	16.20	0.216	*06*	15.9	0.174	..	15.3	0.019	..
" .794	15.75	0.170	*10*	16.05	0.475	*03*	15.80	0.208	*15*	16.02	0.246	*27*	16.12	0.204	16	15.60	0.049	27
" .798	15.98	0.174	12	16.18	0.479	11	15.98	0.212	02	16.42	0.250	13	16.08	0.208	12	15.55	0.053	22
" .825	16.02	0.201	09	15.82	0.506	02	15.78	0.239	*05*	16.40	0.277	08	16.08	0.235	09	15.38	0.080	*01*
" .839	16.02	0.215	05	15.40	0.520	*05*	15.52	0.253	*21*	16.32	0.291	00	15.98	0.249	*03*	15.48	0.094	06

J. D.	No. 55. Per. $0^d.719615$			No. 56. Per. $0^d.570307$			No. 57. Per. $0^d.348935$			No. 58. Per. $0^d.420463$			No. 59. Per. $0^d.565260$			No. 60. Per. $0^d.691852$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		d.			d.			d.			d.			d.			d.	
0724.856	16.02	0.232	01	15.15	0.537	*11*	15.35	0.270	*23*	16.25	0.308	*03*	16.0	0.266	..	15.3	0.111	..
" .862	15.78	0.238	*25*	15.20	0.543	*02*	15.35	0.276	*20*	16.3	0.314	..	16.0	0.272	..	15.3	0.117	..
" .894	15.95	0.270	*12*	15.20	0.005	01	15.28	0.308	*09*	15.85	0.346	*15*	16.10	0.304	01	15.60	0.149	03
" .911	16.02	0.287	*08*	15.32	0.022	10	15.38	0.325	07	15.75	0.363	*07*	16.00	0.321	*10*	15.68	0.166	06
" .946	16.12	0.322	*04*	15.62	0.057	30	15.25	0.011	*06*	15.51	0.398	*13*	16.28	0.356	18	15.90	0.201	17
" .982	16.30	0.358	09	15.65	0.093	15	15.4	0.047	..	15.45	0.014	*23*	16.12	0.392	02	15.89	0.237	06
" .987	16.10	0.363	*12*	15.60	0.098	07	15.50	0.052	01	15.50	0.019	*20*	15.98	0.397	*12*	15.90	0.242	06
0725.653	16.30	0.310	16	16.05	0.193	07	15.42	0.021	07	16.25	0.264	*06*	15.85	0.498	*05*	15.75	0.216	*02*
" .677	16.08	0.334	*10*	16.05	0.217	03	15.48	0.045	03	16.30	0.288	*02*	15.62	0.522	*03*	15.84	0.240	00
" .711	16.20	0.368	*03*	15.95	0.251	*10*	15.60	0.079	*01*	16.00	0.322	*21*	15.38	0.556	*12*	16.00	0.274	09
" .721	16.35	0.378	11	16.15	0.261	09	15.60	0.088	*05*	16.22	0.332	10	15.48	0.000	*02*	15.90	0.284	*02*
" .729	16.10	0.386	*14*	15.98	0.269	*09*	15.58	0.097	*12*	16.00	0.340	*04*	15.50	0.008	*01*	15.85	0.292	*08*
" .792	16.25	0.449	*02*	16.20	0.332	10	16.00	0.160	08	15.85	0.403	21	15.78	0.071	10	16.15	0.355	18
" .812	16.25	0.469	*03*	16.00	0.352	*10*	15.98	0.180	02	15.98	0.003	33	15.80	0.091	07	16.10	0.375	11
" .821	16.40	0.478	12	16.30	0.361	20	16.00	0.189	03	16.20	0.012	53	16.00	0.100	25	16.15	0.384	16
" .852	16.35	0.509	05	16.10	0.392	*01*	15.90	0.220	*03*	15.98	0.043	24	15.82	0.131	*01*	16.0	0.415	..
" .857	16.22	0.514	*08*	16.00	0.397	*11*	15.90	0.225	*01*	15.85	0.048	09	15.80	0.136	*03*	15.92	0.420	*08*
" .916	16.25	0.573	*05*	16.25	0.456	15	15.35	0.284	*15*	16.05	0.107	12	15.88	0.195	*05*	15.92	0.479	*08*
" .926	16.52	0.583	22	16.25	0.466	16	15.50	0.294	05	16.25	0.117	27	16.05	0.205	10	15.9	0.489	..
" .937	16.05	0.594	*24*	16.08	0.477	01	15.50	0.305	13	16.35	0.128	33	16.15	0.216	18	15.80	0.500	*20*
" .967	16.15	0.624	*12*	15.45	0.507	*30*	15.25	0.335	*04*	16.3	0.158	..	16.0	0.246	..	16.0	0.530	..
" .972	16.20	0.629	*06*	15.48	0.512	*07*	15.30	0.340	02	16.2	0.163	..	15.9	0.251	..	16.0	0.535	..
" .981	16.3	0.638	..	15.35	0.521	*09*	15.42	0.349	15	16.45	0.172	27	16.0	0.260	..	16.0	0.544	..
" .994	16.2	0.651	..	15.2	0.534	..	15.4	0.013	..	16.3	0.185	..	15.9	0.273	..	16.0	0.557	..
1099.717	15.90	0.174	03	15.88	0.136	12	15.76	0.026	39	16.30	0.116	33	15.85	0.360	*25*	15.5	0.733	..
" .737	15.9	0.194	..	15.9	0.156	..	15.6	0.046	..	....	....	..	....	....	..	15.3	0.008	..
" .772	16.00	0.229	00	16.18	0.191	20	15.65	0.081	02	16.30	0.171	13	16.15	0.415	05	15.5	0.043	..
" .917	16.1	0.374	..	16.0	0.336	..	16.2	0.226	..	....	....	..	....	....	..	15.6	0.188	..
1113.627	16.15	0.412	*12*	16.25	0.358	14	15.30	0.328	00	16.32	0.151	19	15.75	0.138	*08*	15.40	0.061	05
" .636	16.42	0.421	16	16.12	0.367	01	15.12	0.337	*15*	16.25	0.160	11	15.95	0.147	10	15.35	0.070	*02*
" .683	16.38	0.468	10	16.05	0.414	*06*	15.78	0.035	37	16.35	0.207	11	16.18	0.194	25	15.62	0.117	15
" .721	16.30	0.496	02	16.10	0.452	00	15.64	0.073	05	16.35	0.245	06	16.00	0.232	01	15.45	0.155	*15*
" .763	16.30	0.548	00	15.78	0.494	*18*	15.98	0.115	24	16.38	0.287	06	16.10	0.274	06	15.60	0.197	*12*
" .775	16.40	0.560	10	15.90	0.506	10	15.95	0.127	15	16.30	0.299	*01*	16.20	0.286	14	15.78	0.209	03
" .811	16.00	0.596	*29*	15.30	0.542	07	15.88	0.163	*04*	16.0	0.335	..	16.1	0.322	..	16.02	0.245	17
" .897	15.55	0.682	03	15.45	0.058	13	15.80	0.249	05	16.05	0.000	41	15.9	0.408	..	15.85	0.331	*11*
" .921	15.55	0.706	06	15.58	0.082	15	15.45	0.273	*12*	15.88	0.024	18	15.85	0.432	*25*	15.8	0.355	..
" .930	15.65	0.715	16	15.60	0.091	10	15.58	0.282	06	16.00	0.033	28	15.9	0.441	..	15.88	0.364	*10*
1128.623	....	....	..	15.3	0.527	..	15.5	0.320	..	....	....	..	....	....	..	....	....	..
1132.533	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
" .660	15.5	0.015	..	15.3	0.001	..	....	....	..	....	....	..	....	....	..	....	....	..
1133.533	16.1	0.168	..	16.0	0.304	..	15.25	0.345	*02*	....	....	..	....	....	..	....	....	..
" .612	....	....	..	16.1	0.383	..	....	....	..	....	....	..	....	....	..	....	....	..
1135.582	....	....	..	15.2	0.072	..	15.2	0.300	..	....	....	..	....	....	..	....	....	..
" .618	15.9	0.094	..	15.3	0.108	..	15.25	0.336	*03*	....	....	..	....	....	..	....	....	..
1137.574	16.1	0.611	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
1139.618	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
1163.490	....	....	..	15.2	0.035	..	....	....	..	....	....	..	....	....	..	....	....	..
" .548	....	....	..	....	....	..	15.3	0.002	..	....	....	..	....	....	..	....	....	..
1164.471	....	....	..	15.9	0.445	..	....	....	..	....	....	..	....	....	..	....	....	..

J. D.	No. 61. Per. $0^d.61030$			No. 62. Per. $0^d.38818$			No. 63. Per. $0^d.67370$			No. 64. Per. $0^d.351695$			No. 65. Per. $0^d.756048$			No. 66. Per. $0^d.379330$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		*d.*			*d.*			*d.*			*d.*			*d.*			*d.*	
3770.633	....	....	..	....	....	..	....	....	..	15.7	0.053	..	....	....	..	15.4	0.093	..
3815.548	....	....	..	....	....	..	....	....	..	15.9	0.303	..	15.60	0.068	02	....	....	..
" .635	....	....	..	....	....	..	....	....	..	15.8	0.038	..	....	....	..	15.44	0.334	*09*
3833.554	....	....	..	....	....	..	....	....	..	....	....	..	15.6	0.685	..	....	....	..
4086.763	....	....	..	....	....	..	....	....	..	15.6	0.099	..	....	....	..	....	....	..
4140.634	....	....	..	....	....	..	....	....	..	....	....	..	15.32	0.053	*22*	16.0	0.247	..
4200.535	....	....	..	....	....	..	....	....	..	15.95	0.184	*22*	15.55	0.227	*35*	16.15	0.214	05
4210.527	....	....	..	....	....	..	....	....	..	15.65	0.329	01	15.68	0.390	*45*	15.65	0.343	16
4212.581	16.4	0.312	..	....	....	..	....	....	..	15.85	0.272	*24*	15.6	0.176	..	15.65	0.122	*17*
6761.629	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	15.85	0.072	28
6767.536	....	....	..	....	....	..	....	....	..	....	....	..	15.8	0.445	..	15.78	0.289	*11*
8183.646	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	15.55	0.360	12
0724.652	16.28	0.482	12	15.6	0.350	..	15.55	0.032	*02*	15.70	0.007	07	16.40	0.405	26	16.20	0.234	12
" .669	16.02	0.499	*11*	15.62	0.367	*03*	15.52	0.049	*07*	15.65	0.024	00	16.20	0.422	05	16.10	0.251	04
" .699	15.68	0.529	*02*	15.62	0.009	*05*	15.55	0.079	*09*	15.58	0.054	*14*	16.25	0.452	08	15.92	0.281	*01*
" .703	15.65	0.533	*02*	15.55	0.013	*12*	15.62	0.083	*03*	15.70	0.058	*04*	16.08	0.456	*10*	15.75	0.285	*16*
" .733	15.45	0.563	*02*	15.58	0.043	*16*	15.62	0.113	*11*	15.75	0.088	*09*	15.92	0.486	*26*	15.52	0.315	*15*
" .738	15.35	0.568	*11*	15.70	0.048	*06*	16.02	0.118	*27*	15.90	0.093	05	16.08	0.491	*10*	15.54	0.320	*08*
" .764	15.31	0.594	*12*	15.9	0.074	..	15.88	0.144	04	15.85	0.119	*10*	15.92	0.517	*26*	15.44	0.346	*03*
" .794	15.52	0.014	07	16.12	0.104	11	15.86	0.174	*08*	15.95	0.149	*13*	15.88	0.547	*30*	15.54	0.376	13
" .798	15.52	0.018	06	16.35	0.108	32	16.02	0.178	07	16.20	0.153	12	15.88	0.551	*30*	15.52	0.001	11
" .825	15.55	0.045	03	15.90	0.135	*24*	16.25	0.205	22	16.30	0.180	14	16.10	0.578	*08*	15.55	0.028	12
" .839	15.54	0.059	*01*	16.35	0.149	17	16.20	0.219	12	15.95	0.194	*24*	15.98	0.592	*19*	15.44	0.042	*04*
" .856	15.48	0.076	*14*	16.3	0.166	..	16.1	0.236	..	16.20	0.211	*02*	15.95	0.609	*21*	15.48	0.059	*04*
" .862	15.3	0.082	..	16.0	0.172	..	15.9	0.242	..	16.0	0.217	..	15.55	0.615	*60*	15.55	0.065	02
" .894	15.92	0.114	17	16.38	0.204	12	16.32	0.274	12	16.25	0.249	04	15.95	0.647	03	15.71	0.097	03
" .911	15.88	0.131	06	15.95	0.221	*31*	16.25	0.291	01	15.72	0.266	*41*	15.72	0.664	02	15.72	0.114	*06*
" .946	16.08	0.166	15	15.98	0.256	*26*	16.25	0.326	*05*	15.75	0.301	*05*	15.58	0.699	08	15.95	0.149	01
" .982	16.05	0.202	02	15.80	0.292	*25*	16.35	0.362	01	15.52	0.337	*09*	15.35	0.735	*08*	16.15	0.185	07
" .987	16.15	0.207	11	15.80	0.297	*15*	16.50	0.367	15	15.58	0.342	*03*	15.42	0.740	*01*	15.82	0.190	*27*
0725.653	15.85	0.263	*27*	16.35	0.187	10	16.30	0.359	*03*	15.70	0.305	*07*	15.62	0.650	*25*	15.69	0.097	01
" .677	16.08	0.287	*06*	16.32	0.211	06	16.35	0.383	*03*	15.68	0.329	05	15.71	0.674	08	15.98	0.121	16
" .711	16.00	0.321	*16*	16.30	0.245	04	16.28	0.417	*13*	15.75	0.011	12	15.44	0.708	*03*	15.98	0.155	00
" .721	16.4	0.331	..	16.42	0.255	17	16.52	0.427	10	15.85	0.021	21	15.52	0.718	08	16.08	0.165	05
" .729	16.05	0.339	*11*	16.00	0.263	*24*	16.32	0.435	*10*	15.60	0.029	*05*	15.58	0.726	15	15.95	0.173	*10*
" .792	16.08	0.402	*08*	15.65	0.326	*03*	16.50	0.498	06	15.85	0.092	00	15.58	0.033	07	16.02	0.236	*06*
" .812	16.10	0.422	*06*	15.62	0.346	*03*	16.50	0.518	06	15.90	0.112	*01*	15.56	0.053	03	15.96	0.256	*09*
" .821	16.40	0.431	24	16.10	0.355	45	16.55	0.527	11	16.35	0.121	39	15.90	0.062	33	16.01	0.265	*01*
" .852	15.98	0.462	*18*	15.85	0.386	19	16.20	0.558	*16*	16.25	0.152	17	15.64	0.093	01	15.75	0.296	*10*
" .857	15.92	0.467	*24*	15.75	0.002	09	15.82	0.563	*48*	16.10	0.157	01	15.58	0.098	*06*	15.78	0.301	*01*
" .916	15.60	0.526	*13*	15.80	0.061	00	15.60	0.622	*15*	16.25	0.216	02	15.70	0.157	*07*	15.45	0.360	02
" .926	15.80	0.536	17	16.22	0.071	38	15.82	0.632	16	16.48	0.226	24	15.99	0.167	19	15.49	0.370	07
" .937	15.50	0.547	*03*	15.92	0.082	04	15.58	0.643	*03*	16.32	0.237	09	15.75	0.178	*07*	15.49	0.002	08
" .967	15.34	0.577	*11*	16.0	0.112	..	15.55	0.674	01	16.1	0.267	..	15.80	0.208	*07*	15.50	0.032	06
" .972	15.6	0.582	..	16.3	0.117	..	15.6	0.005	..	15.9	0.272	..	15.8	0.213	..	15.38	0.037	*08*
" .981	15.6	0.591	..	16.3	0.126	..	15.6	0.014	..	16.0	0.281	..	15.9	0.222	..	15.52	0.046	02
" .994	15.8	0.604	..	16.1	0.139	..	15.9	0.027	..	16.1	0.294	..	15.8	0.235	..	15.4	0.059	..
1099.717	....	....	..	15.55	0.045	*20*	16.3	0.521	..	15.9	0.165	..	16.3	0.471	..	16.08	0.142	16
" .737	....	....	..	....	....	..	....	....	..	16.4	0.185	..	16.3	0.491	..	16.3	0.162	..
" .772	16.30	0.268	17	16.18	0.100	21	15.90	0.576	*30*	15.88	0.220	*35*	16.28	0.526	10	16.10	0.197	00

J. D.	No. 61. Per. $0^d.61030$			No. 62. Per. $0^d.38818$			No. 63. Per. $0^d.67370$			No. 64. Per. $0^d.351695$			No. 65. Per. $0^d.756048$			No. 66. Per. $0^d.379330$		
	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.	Magn.	Phase	Res.
d.		*d.*			*d.*			*d.*			*d.*			*d.*			*d.*	
1099.917	....	....	..	....	....	..	....	....	..	....	....	..	15.5	0.671	..	15.72	0.342	24
1113.627	15.5	0.086	..	15.70	0.369	05	15.95	0.282	*27*	15.52	0.007	*11*	15.52	0.016	06	15.42	0.017	00
" .636	15.60	0.095	*08*	15.82	0.378	17	16.30	0.291	06	15.72	0.016	08	15.75	0.025	26	15.52	0.026	09
" .683	16.35	0.142	48	15.85	0.037	12	16.30	0.338	*02*	16.22	0.063	46	15.75	0.072	15	15.60	0.073	02
" .721	15.82	0.180	*16*	15.72	0.075	*12*	16.35	0.376	*02*	15.88	0.101	00	15.65	0.110	*02*	15.80	0.111	05
" .763	16.10	0.222	02	15.75	0.117	*31*	16.28	0.418	*12*	16.00	0.143	*04*	15.95	0.152	18	15.94	0.153	*03*
" .775	16.05	0.234	*04*	16.08	0.129	*04*	16.28	0.430	*14*	16.40	0.155	31	16.02	0.164	23	15.98	0.165	*05*
" .811	16.25	0.270	12	16.3	0.165	..	16.35	0.466	*08*	16.20	0.191	02	16.30	0.200	45	16.20	0.201	10
" .897	16.10	0.356	*06*	16.32	0.251	07	16.20	0.552	*20*	16.10	0.277	03	15.98	0.286	*01*	15.88	0.287	*02*
" .921	15.95	0.380	*21*	16.35	0.275	15	16.35	0.576	12	15.88	0.301	08	15.98	0.310	*05*	15.88	0.311	17
" .930	16.0	0.389	..	16.2	0.284	..	16.3	0.585	..	15.85	0.310	12	16.12	0.319	08	15.66	0.320	04
1128.623	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
1132.533	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	15.3	0.335	..
" .660	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
1133.533	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	16.0	0.198	..
" .612	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
1135.582	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
" .618	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	15.35	0.007	*06*
1137.574	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	15.6	0.066	..
1139.618	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
1163.490	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..
" .548	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	15.9	0.246	..
1164.471	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..	....	....	..

In a few cases, measures of difficult stars have been possible on the Mount Wilson plates, when not advisable on the Arequipa or Cambridge plates. Periods have been determined, therefore, in such cases from the Mount Wilson plates only, but since such periods depend upon the observations of four nights and cover an interval of little more than one year, these periods are less precise than those derived from all the plates. The results for the last two plates, H 1745 and H 1746, made on J. D. 1184.501 and 1184.540, are given in Table XLIII. The first column gives the number of the variable. When no measures were made the variable is omitted. Results corresponding to those found in Table XLII are given in the following six columns for J. D. 1184.501 and J. D. 1184.540.

TABLE XLIII

ADDITIONAL OBSERVATIONS OF THE VARIABLES

Var.	J. D. 1184.501			J. D. 1184.540			Var.	J. D. 1184.501			J. D. 1184.540		
	Magn.	Phase	Res.	Magn.	Phase	Res.		Magn.	Phase	Res.	Magn.	Phase	Res.
		d.			*d.*				*d.*			*d.*	
1	14.9	0.205	..	14.65	0.244	*19*	29	16.2	0.090	..	15.2	0.129	..
2	15.3	0.653	..	15.40	0.028	17	30	15.62	0.086	01	15.65	0.125	*09*
3	15.6	0.047	..	16.1	0.086	..	31	15.95	0.249	*08*	16.3	0.288	..
4	15.95	0.221	*05*	15.60	0.260	*05*	32	15.95	0.463	*03*	16.0	0.502	..
5	15.40	0.354	00	15.30	0.008	*03*	35	15.50	0.071	*06*	15.58	0.110	*13*
6	....	....	..	15.7	0.097	..	38	15.38	0.048	*01*	15.35	0.087	*22*
7	....	....	..	15.8	0.181	..	39	15.58	0.325	*18*	15.22	0.364	*18*
8	16.00	0.578	*04*	15.62	0.617	24	40	15.40	0.024	05	15.45	0.063	02
9	15.72	0.309	*16*	15.85	0.348	*07*	41	....	....	..	16.1	....	..
10	15.88	....	..	16.05	....	..	42	16.02	0.213	*05*	15.98	0.252	*06*
11	16.20	0.162	22	16.00	0.201	*05*	43	15.85	0.068	49	15.43	0.107	*09*
12	15.15	0.049	*15*	15.20	0.088	*24*	44	15.9	0.191	..	16.1	0.230	..
13	15.32	0.033	12	15.25	0.072	*15*	45	16.1	0.154	..	16.1	0.193	..
14	16.15	0.185	18	16.05	0.224	05	48	....	....	..	15.2	0.017	..
15	15.90	0.257	*10*	16.20	0.296	12	49	....	....	..	14.89	0.088	*15*
17	15.85	0.399	*05*	15.90	0.438	00	50	15.85	0.109	03	15.8	0.148	..
19	16.15	0.497	09	15.10	0.536	*15*	51	15.80	0.098	03	15.9	0.137	..
20	16.1	0.326	..	15.70	0.365	*37*	52	16.30	0.360	09	16.15	0.399	*07*
22	15.5	0.099	..	....	....	..	53	15.40	0.043	07	15.48	0.082	02
23	15.80	0.270	*07*	16.05	0.309	12	54	15.80	0.376	18	15.9	0.017	..
24	16.15	0.227	*02*	16.1	0.266	..	56	....	....	..	15.2	0.553	..
25	....	....	..	15.55	0.099	09	57	15.32	0.019	*02*	....	....	..
26	15.65	0.399	32	15.48	0.036	11	64	16.1	0.190	..	....	....	..
27	....	....	..	16.55	....	..	66	15.5	0.335	..	....	....	..
28	15.90	0.358	*16*	16.25	0.397	17							

Remeasurements are given in Table XLIV for all cases where the difference between the results of the first measures by Miss Leland and Miss Woods amounted to as much as 0.50 magn. The number of these large discordances is perhaps not greater than might be expected, when difficult objects are independently measured by two observers. In general, these measures were accompanied by the remark, "difficult," or "doubtful." A different sequence of comparison stars was used in several cases. While this should make no difference, so far as the magnitudes of the comparison stars are concerned, discordances of considerable amount may occur due to the variation in form and definition of the stellar images on different parts of the plate. Moreover, the presence and position of the mass of stars forming the centre of the cluster, the direction and distance of the comparison stars, the proximity of adjacent stars, the varying density of the background of faint stars,

the position in which the plate is held, and doubtless many other factors, exert a greater or less influence on the measures and occasionally unite to bring about large differences. It appears from Table XLIV that remeasurements decrease these discordances, which could be still further reduced in many cases by repeated measures, if these were necessary. A curious feature of these discordant cases is the fact that in general the magnitude derived by Miss Leland is brighter than that obtained by Miss Woods, that is, L—W is negative. The mean value of L—W for all the original measures given in the third and fourth columns of Table XLIV is −0.43 magn. The corresponding value for the remeasures is −0.25 magn. Such a difference between the two observers does not appear, however, when all the measures given in Tables XLII and XLIII are considered. To avoid prejudice, the ten variables, Nos. 10, 15, 20, 25, 30, 35, 40, 45, 50, and 55, were selected. The mean values of L—W for all the observations of these ten variables are +0.02, −0.01, −0.04, +0.05, +0.09, −0.02, −0.06, −0.04, +0.01, and −0.06, respectively, the mean of all being −0.006 magn. It thus appears that in general there is practically no difference in the magnitudes as estimated by the two observers, but that, in the case of difficult and discordant observations, L—W usually becomes a large negative quantity. The mean differences in the magnitudes derived by L and W for the above ten stars, without regard to sign, are ±0.11, ±0.11, ±0.11, ±0.12, ±0.15, ±0.13, ±0.19, ±0.12, ±0.10, and ±0.18 magn., and for all, ±0.13 magn.

The first column in Table XLIV gives the number of the variable, the second column, the Julian Date of the observation, and the third and fourth columns, the original measures by L and W. The fifth and sixth columns give the results of the corresponding remeasurements, the seventh column, the adopted mean magnitude, and the eighth column, the residuals from this mean. Whenever an individual determination differed by 0.50 magn. from the mean of all, it was rejected and the mean of the other measures was adopted. Dots in the columns of magnitude indicate that the observer considered the image of the star too difficult for measurement, and in the column of residuals, that the corresponding magnitudes were missing or rejected for discordance. The large differences given in this table appear to be due, with a few exceptions, to accidental errors of observation, due to unavoidable causes. The mean magnitudes, however, derived from the four measures are reasonably good and have been included also in Tables XLII and XLIII. The mean deviation from the smooth curves, drawn through all the observations, for the magnitudes given in Table XLIV is ±0.15 magn., and shows that the mean magnitude derived from several measures of even a very difficult object is, in general, fairly satisfactory.

TABLE XLIV

REMEASUREMENTS OF THE VARIABLES

No.	J. D.	1. Magn.		2. Magn.		Mean Magn.	Residuals
		L	W	L	W		
	d.						
3	0725.821	15.5	16.0	15.6	16.0	15.78	3, 2, 2, 2
"	1113.775	16.2	15.7	15.8	15.6	15.82	4, 1, 0, 2
4	1113.636	16.1	15.6	16.0	16.1	15.95	1, 4, 0, 1
"	1132.533	16.2	15.5	15.3	15.4	15.40	., 1, 1, 0
5	1132.533	15.6	16.1	16.0	..	15.90	3, 2, 1, .
6	1113.775	16.0	16.5	16.2	16.4	16.28	3, 2, 1, 1
7	0725.821	15.8	16.4	16.0	16.2	16.10	3, 3, 1, 1
"	1099.772	16.0	16.6	16.2	16.1	16.22	2, 4, 0, 1
"	" .917	15.5	16.0	15.8	15.9	15.80	3, 2, 0, 1
"	1113.775	16.0	16.6	16.0	16.4	16.25	2, 4, 2, 2
8	" .811	15.9	16.4	15.9	16.4	16.15	3, 2, 3, 2
"	" .930	15.9	16.4	15.9	16.0	16.05	1, 4, 1, 0
9	" .775	15.6	16.1	15.9	15.8	15.85	2, 3, 1, 0
11	0724.699	15.2	15.7	15.2	15.3	15.35	2, 3, 2, 1
"	0725.653	15.2	15.8	15.4	15.8	15.55	4, 2, 2, 2
13	" .812	15.6	16.1	15.8	15.8	15.82	2, 3, 0, 0
"	1184.501	15.1	15.7	15.2	15.3	15.32	2, 4, 1, 0
15	1132.660	15.9	16.5	16.0	16.4	16.20	3, 3, 2, 2
20	0725.721	16.2	16.7	16.3	16.6	16.45	2, 3, 1, 2
21	4200.535	15.3	15.9	15.5	15.8	15.62	3, 3, 1, 2
"	4210.527	15.6	16.3	15.8	16.2	15.98	4, 3, 2, 2
"	4212.581	15.4	16.2	15.5	15.9	15.75	4, 4, 3, 1
"	0724.798	15.2	15.8	15.5	15.6	15.52	3, 3, 0, 1
"	" .825	15.4	16.0	15.5	16.0	15.72	3, 3, 2, 3
"	" .839	15.4	16.0	15.6	15.8	15.70	3, 3, 1, 1
"	0725.821	16.1	16.7	16.1	16.6	16.38	3, 3, 3, 2
"	" .857	15.4	16.1	15.5	16.1	15.78	4, 3, 3, 3
"	" .926	15.3	16.0	15.3	15.9	15.62	3, 4, 3, 3
"	1099.737	15.4	16.0	15.3	15.9	15.65	2, 4, 3, 3
"	" .917	15.8	16.3	15.6	16.3	16.00	2, 3, 4, 3
"	1113.636	15.9	16.6	15.8	16.2	16.12	2, 5, 3, 1
"	" .775	16.0	16.5	16.1	16.5	16.28	3, 2, 2, 2
"	" .921	15.1	15.7	15.2	15.5	15.38	3, 3, 2, 1
22	4210.527	15.6	16.2	15.8	16.0	15.90	3, 3, 1, 1
"	1133.533	15.5	16.0	15.8	16.0	15.82	3, 2, 0, 2
"	1184.540	15.5	16.0	15.8	16.0	15.82	3, 2, 0, 2
23	1128.623	15.8	15.2	15.6	15.5	15.52	3, 3, 1, 0
"	1132.533	16.0	15.5	15.8	15.8	15.78	2, 3, 0, 0
"	1135.582	15.9	15.4	15.2	15.3	15.45	5, 0, 3, 2
"	1163.548	15.8	15.3	15.8	15.8	15.68	1, 4, 1, 1
24	4210.527	15.5	16.2	16.0	16.0	15.92	4, 3, 1, 1
26	0725.721	15.8	16.3	15.9	15.9	15.98	2, 3, 1, 1
27	3815.548	16.5	17.0	16.3	16.7	16.62	1, 4, 3, 1
"	0724.764	16.4	16.9	16.5	..	16.60	2, 3, 1, .
"	" .825	17.5	17.0	17.0	16.8	17.08	4, 1, 1, 3
"	" .911	16.9	16.4	16.8	16.6	16.68	2, 3, 1, 1
31	1184.501	16.3	15.7	16.2	15.6	15.95	3, 3, 2, 4
32	1164.471	16.2	15.7	16.3	..	16.07	1, 4, 2, .
33	0724.856	15.6	16.4	15.6	16.0	15.73	1, ., 1, 3
"	0725.821	15.8	16.4	15.8	16.4	16.10	3, 3, 3, 3
"	" .926	15.7	16.4	15.6	16.4	16.02	3, 4, 4, 4
"	1113.683	15.5	16.0	15.8	16.1	15.85	3, 2, 0, 3
"	" .721	15.6	16.2	15.6	16.0	15.85	2, 4, 2, 2
"	" .775	15.5	16.0	15.5	16.2	15.80	3, 2, 3, 4
34	0724.669	14.6	15.1	14.7	15.1	14.88	3, 2, 2, 2
"	" .703	14.5	15.1	14.7	15.0	14.82	3, 3, 1, 2
35	3815.635	15.6	16.2	15.7	15.9	15.85	2, 4, 1, 1
36	4212.581	15.3	15.9	15.5	15.8	15.62	3, 3, 1, 2
"	0724.946	15.6	16.1	15.8	15.9	15.85	2, 3, 0, 1
"	0725.821	15.9	16.7	16.2	16.6	16.35	5, 3, 2, 2
"	" .926	16.1	16.6	..	16.6	16.43	3, 2, ., 2
"	1113.763	15.5	16.0	15.6	15.9	15.75	3, 2, 2, 1
"	" .775	15.5	16.0	15.7	15.9	15.78	3, 2, 1, 1
37	0724.669	16.2	15.6	16.0	15.9	15.92	3, 3, 1, 0
"	" .856	15.4	16.0	15.5	15.7	15.65	2, 4, 1, 1
"	0725.857	15.3	15.8	15.5	15.8	15.60	3, 2, 1, 2
"	" .926	15.3	16.0	15.3	16.0	15.65	3, 4, 3, 4
"	1099.772	15.4	15.9	15.5	16.0	15.70	3, 2, 2, 3
"	1113.683	15.5	16.4	15.9	16.3	16.20	., 2, 3, 1
38	1099.737	15.6	16.2	15.7	16.0	15.88	3, 3, 2, 1
"	1113.636	15.6	16.1	15.8	15.9	15.85	2, 3, 0, 1
"	" .683	15.6	16.6	15.8	16.4	16.10	., ., 3, 3
"	1133.612	15.6	16.1	15.8	16.2	15.92	3, 2, 1, 3
39	3815.635	15.6	16.1	15.7	15.8	15.78	2, 3, 1, 0
"	1099.737	15.7	16.2	15.9	16.0	15.95	3, 2, 1, 0
"	1139.618	15.6	16.1	15.5	15.8	15.75	2, 3, 3, 0
40	8183.646	15.6	16.1	15.6	15.8	15.78	2, 3, 2, 0
"	0724.652	15.5	16.2	15.5	16.0	15.80	3, 4, 3, 2
"	0725.821	15.6	16.3	15.6	16.2	15.92	3, 4, 3, 3
"	1113.775	15.6	16.2	15.6	16.2	15.90	3, 3, 3, 3
"	1163.490	16.1	15.6	16.0	15.7	15.85	3, 2, 2, 1
42	1139.618	15.2	15.7	15.1	15.0	15.25	0, 5, 1, 2
43	0725.967	15.8	15.3	15.7	15.6	15.60	2, 3, 1, 0
"	1113.636	15.8	15.3	15.6	15.4	15.52	3, 2, 1, 1
"	1132.533	16.0	15.5	15.9	15.8	15.80	2, 3, 1, 0
"	1139.618	15.2	15.8	15.3	15.6	15.48	3, 3, 2, 1
"	1184.540	15.7	15.2	..	15.4	15.43	3, 2, ., 0
44	0725.792	15.1	15.6	15.2	15.4	15.32	2, 3, 1, 1
"	1099.737	15.2	15.8	15.2	15.4	15.40	2, 4, 2, 0
45	0724.894	15.2	15.7	15.3	15.2	15.35	2, 3, 1, 2
46	0725.821	15.3	16.0	15.5	15.9	15.68	4, 3, 2, 2
"	1099.717	16.2	16.7	16.3	16.3	16.38	2, 3, 1, 1
47	0725.721	16.0	16.6	16.0	16.3	16.22	2, 4, 2, 1
"	1113.683	15.2	15.7	15.3	15.6	15.45	2, 3, 1, 2

No.	J. D.	1. Magn.		2. Magn.		Mean Magn.	Residuals
		L	W	L	W		
	d.						
51	0725.926	15.5	16.2	15.8	16.0	15.88	*4, 3, 1, 1*
53	0724.699	15.3	15.9	15.5	15.6	15.58	*3, 3, 1, 0*
"	" .911	15.6	16.1	15.6	15.8	15.78	*2, 3, 2, 0*
"	0725.812	15.6	16.1	15.7	15.9	15.82	*2, 3, 1, 1*
"	" .821	15.6	16.2	15.6	16.0	15.85	*2, 4, 2, 2*
"	1099.737	15.6	16.2	15.6	16.0	15.85	*2, 4, 2, 2*
"	1113.775	15.5	16.2	15.6	16.0	15.82	*3, 4, 2, 2*
"	" .811	15.5	16.0	15.6	15.8	15.72	*2, 3, 1, 1*
"	1133.612	15.5	16.1	15.8	15.8	15.80	*3, 3, 0, 0*
54	4210.527	15.7	16.2	15.9	16.2	16.00	*3, 2, 1, 2*
"	0725.721	15.7	16.2	15.8	16.2	15.98	*3, 2, 2, 2*
"	" .821	16.0	16.6	16.0	16.4	16.25	*2, 4, 2, 2*
"	" .926	16.0	16.6	16.2	16.6	16.35	*4, 2, 2, 2*
"	1099.772	15.8	16.3	16.0	16.0	16.02	*2, 3, 0 0*
55	0725.721	16.1	16.6	16.3	16.4	16.35	*3, 2, 1, 0*
"	" .926	16.2	16.9	16.3	16.7	16.52	*3, 4, 2, 2*
"	1113.763	16.1	16.6	16.1	16.4	16.30	*2, 3, 2, 1*
55	1113.775	16.2	16.7	16.1	16.6	16.40	*2, 3, 3, 2*
56	0725.821	16.1	16.6	16.2	16.3	16.30	*2, 3, 1, 0*
57	1113.683	15.5	16.0	15.6	16.0	15.78	*3, 2, 2, 2*
"	" .930	15.3	15.8	15.5	15.7	15.58	*3, 2, 1, 1*
58	0724.733	15.7	16.3	15.9	16.0	15.98	*3, 3, 1, 0*
61	" .669	15.8	16.4	15.9	16.0	16.02	*2, 4, 1, 0*
"	0725.926	15.5	16.2	15.5	16.0	15.80	*3, 4, 3, 2*
"	1113.721	15.5	16.0	15.8	16.0	15.82	*3, 2, 0, 2*
62	0725.926	16.0	16.6	15.9	16.4	16.22	*2, 4, 3, 2*
"	1113.775	15.8	16.4	16.0	16.1	16.08	*3, 3, 1, 0*
63	" .683	15.9	16.7	16.0	16.6	16.30	*4, 4, 3, 3*
"	" .775	16.1	16.6	16.1	16.3	16.28	*2, 3, 2, 0*
64	0725.821	15.9	16.6	16.3	16.6	16.35	*5, 2, 1, 2*
"	" .926	16.2	16.7	16.3	16.7	16.48	*3, 2, 2, 2*
"	1113.683	15.9	16.6	16.0	16.4	16.22	*3, 4, 2, 2*
"	" .775	16.1	16.6	16.3	16.6	16.40	*3, 2, 1, 2*
65	0725.821	15.6	16.2	15.8	16.0	15.90	*3, 3, 1, 1*

CHAPTER XI

THE ELEMENTS OF THE VARIABLES IN MESSIER 15

MEASUREMENTS have been made by two observers of 66 stars on 75 photographs. Periods for 61 of these are given in the following table. The results obtained for the variables in Messier 15 differ in some respects from those found in other clusters already discussed. The variables in this cluster may be divided with reference to the length of period into three classes. The first group consists of those stars whose period is about one third of a day. It is formed by 29 variables which have periods between $0^d.30$ and $0^d.44$. No variables have been found with periods from $0^d.45$ to $0^d.56$. The second group of variables has periods between $0^d.57$ and $0^d.76$. It consists of 31 stars. The third group consists of a single star whose period is $1^d.44$. The light curves of all these variables, with several graphical illustrations, will be found in Chapter XII. The form of the light curve of the first group differs from that of the second group. That of the first group resembles those in ω Centauri, which were put into subclass c, or those of the eight stars in Messier 5 having double maxima. The stars of the second group appear to be of the ordinary cluster type. The mean period of the first group, $0^d.38$, is somewhat more than half that of the second group, $0^d.64$, which is less than half that of the single variable whose period is $1^d.44$. The magnitudes of the variables in this cluster are in general extremely uniform. The mean magnitude of all the variables whose periods were determined, omitting Nos. 1 and 49, is 15.71. Two somewhat striking exceptions occur to this general uniformity, No. 1, whose mean magnitude is 14.95, and No. 49, whose mean magnitude is 15.05. The period of 49 is not widely different from those of other variables in the cluster, and its unusual brightness may be caused by the union of its light with that of another star, although this is not indicated by the light curve. The range of variation of the variables in Messier 15 is rather small, ranging from half a magnitude to a little more than a magnitude. The mean range of all is 0.77 magn. The mean range of the variables of the first group, having periods between $0^d.30$ and $0^d.44$, is 0.67, and of the second group, having periods from $0^d.57$ to $0^d.76$, is 0.84. The range of No. 1 is 1.18 magn. In other clusters, many of the variables have shown a more or less marked indication of a secular

variation in the length of the period. No such variation is clearly manifest in the periods of any of the variables in Messier 15. In many cases, the periods appear to be perfectly uniform during the twenty years covered by the observations, involving, for those of the shortest periods, twenty thousand returns of maximum. The precise value of the period is in doubt in the case of many of the more difficult stars, and for such stars all the elements are to some extent untrustworthy. These difficulties are explained somewhat fully in the remarks following the table of elements. For many stars, however, little or no doubt can be present, and the period is exact to the millionth of a day, and in a few cases, the ten millionths have significance, that is, the period must be exact to the tenth of a second.

In Table XLV, the first column gives the numbers of the variables arranged in the order of discovery, and the second and third columns, the rectangular coordinates from the centre of the cluster, as an origin. These quantities have been taken from H.A. 38, for the first fifty-one variables. The positions for the others have been determined with reference to these stars. The fourth column gives the approximate distance of the star from the centre of the cluster, derived from the preceding two columns. The fifth, sixth, and seventh columns contain the maximum magnitude, the minimum magnitude, and the range. The eighth, ninth, tenth, and eleventh columns give the duration of maximum, minimum, increase, and decrease. The first and second of these quantities are only approximate and give, not the duration of the actual maximum and minimum, which doubtless is near zero in many cases, but the duration of the time during which as determined by the light curves, the brightness is within one tenth of a magnitude of complete maximum or minimum. These quantities are expressed in percentages of the whole period. The twelfth and thirteenth columns give the approximate maximum rate of increase and decrease in light, in magnitudes per hour. The fourteenth column gives the epoch to which the returns of maximum are referred. As in other clusters, this is the time of the first maximum after the beginning of the present century. The Julian Day of this epoch in this cluster is always 2415021. The fifteenth and sixteenth columns give the periods, expressed in decimal parts of a day, and in hours, minutes and seconds. The seventeenth column gives the number of returns of maximum from the first to the last observation used in the determination of the period. The last column gives the mean deviations, from the smooth curve, of the individual observations.

TABLE XLV

ELEMENTS OF THE VARIABLES

No.	X	Y	Dist.	Magnitude			Duration				Incr.	Decr.	Epoch	Period	Period	No. Periods	Mean Dev.
				Max.	Min.	Range	Max.	Min.	Incr.	Decr.							
	″	″	′										*d.*	*d.*	*h.* *m.* *s.*		
1	−118.6	+ 24.4	2.0	14.36	15.54	1.18	13	26	19	42	0.2	0.1	5021.990	1.43744	34 29 54.8	5158	09
2	−171.7	+ 6.0	2.9	15.14	15.95	0.81	11	62	4	23	1.1	0.2	5021.078	0.663520	15 55 28.1	11174	10
3	−248.0	− 46.8	4.2	15.34	16.03	0.69	25	32	12	31	0.9	0.2	5021.097	0.389150	9 20 22.6	19052	09
4	−112.6	−163.6	3.3	15.31	16.08	0.77	29	20	18	33	0.5	0.3	5021.277	0.313575	7 31 32.9	23643	09
5	−100.3	−212.5	3.9	15.33	16.00	0.67	23	29	10	38	0.6	0.1	5021.291	0.384553	9 13 45.4	19280	13
6	+ 24.4	+ 76.5	1.3	15.20	16.29	1.09	12	28	6	54	1.4	0.2	5021.603	0.665965	15 58 59.4	11133	08
7	+ 10.1	+ 73.2	1.2	15.56	16.16	0.60	25	37	11	27	0.5	0.2	5021.134	0.348796	8 22 16.0	21255	16
8	− 0.6	+126.8	2.1	15.22	16.14	0.92	11	39	8	42	0.8	0.2	5021.330	0.646245	15 30 35.6	11473	08
9	+ 15.6	+138.7	2.3	15.12	15.98	0.86	11	41	10	38	0.6	0.1	5021.425	0.715270	17 9 59.3	10365	09
10	+125.6	+ 1.7	2.1	15.50	16.04	0.54	23	35	13	29	0.4	0.1	5021.370	0.39785	9 32 54.	978	07
11	+172.3	− 21.8	2.9	15.28	16.07	0.79	20	36	11	33	1.0	0.3	5021.243	0.3435585	8 14 43.5	21580	10
12	+163.0	− 50.7	2.8	15.22	16.13	0.91	16	41	8	35	1.3	0.2	5021.090	0.592916	14 13 47.9	12504	12
13	+126.6	− 68.8	2.4	15.12	16.20	1.08	11	38	7	44	0.9	0.2	5021.365	0.574970	13 47 57.4	12895	08
14	+ 84.1	−256.2	4.5	15.44	16.00	0.56	43	34	11	12	0.4	0.2	5021.128	0.382000	9 10 4.8	19408	08
15	+ 81.7	−304.1	5.2	15.22	16.16	0.94	21	36	8	35	0.8	0.2	5021.064	0.584243	14 1 18.6	12690	10
16	+101.9	+129.8	2.7	15.50	15.97	0.47	14	47	5	34	0.4	0.1	5021.556	0.69464	16 40 17.	560	07
17	+ 83.7	+110.6	2.3	15.40	15.90	0.50	19	61	5	15	0.3	0.1	5021.216	0.666979	16 0 27.0	11115	10
18	+ 77.3	+100.4	2.1	15.50	16.00	0.50	24	45	11	20	0.3	0.2	5021.331	0.37816	9 4 33.	1029	08
19	+111.3	+160.4	3.2	14.85	16.10	1.25	11	48	8	33	1.5	0.3	5021.552	0.572293	13 44 6.1	12954	10
20	+ 81.2	− 9.8	1.4	15.27	16.17	0.90	11	36	7	46	1.0	0.1	5021.261	0.700570	16 48 49.2	10583	14
21	+ 34.4	− 57.5	1.1	15.25	16.20	0.95	17	32	12	39	0.6	0.1	5021.322	0.624690	14 59 33.2	11718	16
22	−330.8	− 45.8	5.6	15.18	16.04	0.86	12	27	6	55	0.7	0.1	5021.566	0.721728	17 19 17.3	10273	14
23	+192.0	+256.1	5.3	15.07	15.95	0.88	14	44	7	35	1.6	0.2	5021.198	0.632690	15 11 4.4	11718	08
24	−106.7	− 6.1	1.8	15.42	16.17	0.75	28	25	12	35	0.7	0.2	5021.055	0.369697	8 52 21.8	20054	11
25	+302.9	− 10.7	5.1	15.10	16.00	0.90	9	53	8	30	0.6	0.2	5021.499	0.665329	15 58 4.4	11144	08
26	+ 23.5	+331.9	5.5	15.33	15.97	0.64	26	30	13	31	0.4	0.1	5021.272	0.402326	9 39 21.0	18428	10
27	+222.5	+248.2	5.6	..	..	..	..	..	..	..	..	..	....	....	.. .. ..	..	..
28	+309.9	+534.2	10.3	15.19	16.15	0.96	12	38	6	44	1.0	0.2	5021.632	0.670640	16 5 43.3	11055	08
29	+163.3	+212.2	4.5	15.13	16.06	0.93	17	44	6	33	1.5	0.2	5021.281	0.574062	13 46 39.0	12915	11
30	−165.0	− 3.4	2.8	15.42	16.00	0.58	31	33	10	26	0.5	0.2	5021.293	0.405976	9 44 36.3	18262	11
31	−112.6	+245.6	4.5	15.30	16.07	0.77	22	20	16	42	0.2	0.1	5021.375	0.435693	10 27 23.9	17016	14
32	− 50.4	+107.8	2.0	15.14	15.98	0.84	14	60	7	19	1.6	0.1	5021.066	0.605400	14 31 46.6	12246	11
33	− 41.2	− 29.4	0.8	..	..	..	..	..	..	..	..	..	....	....	.. .. ..	..	..
34	− 55.4	− 54.5	1.3	..	..	..	..	..	..	..	..	..	....	....	.. .. ..	..	..
35	− 34.0	−163.6	2.8	15.40	16.11	0.71	33	23	11	33	0.8	0.2	5021.278	0.383997	9 12 57.3	19307	08
36	− 27.7	− 81.6	1.4	15.18	16.26	1.08	10	38	8	44	1.6	0.2	5021.371	0.624142	14 58 45.9	11796	11
37	− 25.2	− 77.4	1.4	..	..	..	..	..	..	..	..	..	....	....	.... ..	..	..
38	+ 7.6	−146.2	2.4	15.29	16.16	0.87	23	29	15	33	0.6	0.3	5021.328	0.375274	9 0 23.7	19756	10
39	+ 20.5	−124.8	2.1	15.34	16.14	0.80	22	24	12	42	0.6	0.2	5021.259	0.389984	9 21 34.6	19011	13
40	+131.8	−116.7	2.9	15.34	16.00	0.66	25	39	6	30	0.8	0.2	5021.320	0.377390	9 3 26.5	19646	13
41	+ 62.9	− 55.4	1.4	..	..	..	..	..	..	..	..	..	....	....	.. .. ..	..	..
42	+227.5	− 36.8	3.8	15.34	16.07	0.73	19	33	17	31	0.4	0.2	5021.110	0.360167	8 38 38.4	20584	07
43	+416.7	+103.2	7.2	15.25	15.88	0.63	25	41	10	24	0.5	0.2	5021.041	0.406744	9 45 42.7	18228	14
44	+ 91.3	+ 3.0	1.5	15.20	16.11	0.91	9	48	5	38	1.5	0.2	5021.373	0.595568	14 17 37.1	12448	11
45	+ 66.9	− 31.0	1.2	15.19	16.14	0.95	9	50	7	34	1.0	0.2	5021.521	0.66210	15 53 25.	694	11
46	+ 56.0	+ 33.2	1.1	15.40	16.32	0.92	12	36	8	44	0.5	0.1	5021.210	0.692730	16 37 31.8	9980	09
47	+ 45.7	− 4.3	0.8	15.32	16.04	0.72	17	40	7	36	0.6	0.1	5021.604	0.662900	15 54 34.6	10550	10

No.	X	Y	Dist.	Magnitude			Duration				Incr.	Decr.	Epoch	Period	Period			No. Periods	Mean Dev.
				Max.	Min.	Range	Max.	Min.	Incr.	Decr.									
	″	″	′										d.	d.	h.	m.	s.		
48	+ 59.7	+150.6	2.7	15.35	16.17	0.82	16	21	23	40	0.3	0.2	5021.266	0.378881	9	5	35.3	18434	10
49	+ 40.3	+166.6	2.9	14.75	15.35	0.60	16	60	5	19	1.4	0.3	5021.037	0.417972	10	1	52.8	17738	08
50	+165.0	+100.0	3.2	15.35	16.00	0.65	19	40	13	28	0.6	0.3	5021.262	0.29850	7	9	50.4	1541	10
51	+ 6.2	+ 91.4	1.5	15.51	16.03	0.52	27	34	10	29	0.4	0.1	5021.158	0.397757	9	32	46.2	18639	12
52	+192.4	− 22.6	3.2	15.12	16.24	1.12	11	41	5	43	1.3	0.3	5021.106	0.575608	13	48	52.5	12880	07
53	− 92.6	−111.0	2.4	15.28	15.91	0.63	25	35	13	27	0.4	0.2	5021.301	0.414135	9	56	21.3	17902	11
54	+ 10.8	+ 88.4	1.5	15.58	16.13	0.55	34	31	10	25	0.5	0.2	5021.240	0.398325	9	33	35.3	18613	12
55	+ 65.3	− 18.8	1.1	15.49	16.30	0.81	15	41	4	40	1.2	0.1	5021.675	0.719615	17	16	14.7	10174	10
56	+ 57.4	0.0	1.0	15.19	16.11	0.92	15	50	8	27	1.0	0.3	5021.249	0.570307	13	41	14.5	12921	11
57	+ 75.2	− 56.4	1.6	15.26	15.97	0.71	19	25	22	34	0.3	0.2	5021.243	0.348935	8	22	28.0	21248	10
58	− 55.6	+ 8.8	0.9	15.64	16.32	0.68	17	33	11	39	0.4	0.2	5021.388	0.420463	10	5	28.0	17358	17
59	+ 41.3	+ 41.5	1.0	15.50	16.10	0.60	14	44	8	34	0.4	0.1	5021.117	0.565260	13	33	58.5	12213	09
60	+ 53.4	− 59.3	1.3	15.29	16.00	0.71	20	45	6	29	0.7	0.1	5021.118	0.691852	16	36	16.0	10079	09
61	− 67.3	− 40.2	1.3	15.43	16.16	0.73	18	49	6	27	1.0	0.1	5021.526	0.61030	14	38	49.9	11308	12
62	− 71.6	+ 39.6	1.4	15.65	16.26	0.61	31	37	8	24	0.7	0.2	5021.161	0.38818	9	18	58.8	1002	15
63	+ 49.8	+ 31.0	1.0	15.54	16.44	0.90	18	29	11	42	0.4	0.1	5021.076	0.67370	16	10	8.	577	11
64	− 46.2	+ 19.1	0.8	15.61	16.24	0.63	25	25	13	37	0.4	0.2	5021.207	0.351695	8	26	26.4	21080	12
65	−102.4	− 38.7	1.8	15.43	16.18	0.75	15	39	7	39	0.5	0.1	5021.377	0.756048	18	8	42.5	9653	15
66	− 68.4	−112.4	2.2	15.41	16.10	0.69	24	28	19	29	0.4	0.2	5021.191	0.379330	9	6	14.1	19544	08

REMARKS

1. This variable is unique. There seems to be no doubt that the period given, $1^d.43744$, is about right. The next longest period found in this cluster is that of No. 65, $0^d.756048$. This is a trifle more than half that of No. 1, while the periods of Nos. 22 and 55 appear to be very nearly one-half. One-fourth of the period of No. 1, or $0^d.36$, is near the mean period of the group of variables having very short periods. The mean magnitude of No. 1 is more than half a magnitude brighter than the mean of all the variables. The only other variable, whose period has been determined and whose magnitude is exceptionally bright, is No. 49.
2. The results for this star appear to be satisfactory. The form of the light curve is that of the ordinary cluster type, approaching that designated in H.A. 38 as Subclass b.
3. The results for this variable are fairly satisfactory, but there are a few large deviations of the individual measures from the smooth curve.
4. The elements of this star appear to be especially trustworthy.
5. The elements of this star are probably about right, although there are several large deviations from the smooth curve.
6. The elements given in the table appear to be trustworthy.
7. The elements are probably about right, although the deviations from the light curve are large. Nos. 6 and 7 are rather difficult objects on many plates.
8. The elements of this star appear to be especially trustworthy.
9. Elements especially trustworthy.
10. No period has been found which satisfies well the X and H plates. The given period yields accordant results for the MW plates, J. D. 0724 to J. D. 1113, and is probably about right.
11. Elements especially trustworthy.
12. Elements appear to be good, although the observation at J. D. 4210 is discordant, which may indicate a slight error in the period.
13. Elements especially trustworthy. The light curve is of the ordinary cluster type.
14. Elements especially trustworthy. The deviations from the smooth curve are small. The accordance may be due in part to the fact that this variable is very near the comparison stars. A typical variable of very short period.
15. Elements trustworthy.
16. The image of this star is confused with that of a close companion on the X and H plates. The measures on these plates were therefore rejected and the given elements depend on the MW plates only. The results appear to be good. The period is rather long and the range small, the form of the light curve being that of Subclass b.
17. The range of variation of this star is small, and for some reason the measures do not seem to give very accordant results. The elements given in the table are probably about right.

18. The measures of this star are somewhat discordant. No period has been found which satisfies well the X and H plates. The elements given in the table depend only on the MW plates, and are apparently about right.
19. The elements of this star appear to be trustworthy.
20. The elements of this star appear to be trustworthy, although there are some discordances.
21. This star is near the centre of the cluster and difficult. The elements given are probably about right, although the results are somewhat discordant.
22. Elements fairly satisfactory.
23. Elements especially trustworthy.
24. The results are somewhat discordant, but the given elements are probably about right.
25. Elements especially trustworthy.
26. The elements given are probably about right. There are a few discordances, perhaps due to the distance of the variable from the comparison stars.
27. This star is nearly a magnitude fainter than the mean magnitude of the variables in the cluster. Its variability is doubtful.
28. Elements especially trustworthy. Light curve is of the ordinary cluster type. It is the most distant variable found in the cluster, whose extreme diameter thus becomes over 20′.
29. This star has a close companion and is a difficult object on many of the X and H plates. The elements are doubtless about right.
30. The elements given appear to be about right although there are several large deviations from the smooth curve.
31. The results appear to be fairly good.
32. Elements appear trustworthy.
33. A difficult object, near the centre of the cluster. It is doubtless variable, but owing to the discordances in the measures, no period has been determined.
34. The variability seems doubtful. A difficult star. No period has been found.
35. Elements especially trustworthy.
36. Elements appear to be trustworthy.
37. A close and difficult star. The image of the variable is confused with that of a close companion on the X and H plates, and these have therefore been omitted. No satisfactory period has been found.
38. The elements appear to be trustworthy.
39. The elements are probably good.
40. The elements are probably about right, in spite of several large discordances.
41. The star is near the centre. The period may be about $0^d.42$.
42. Elements especially trustworthy.
43. The star is distant from the comparison stars, and the image is distorted on many plates. The elements given are not very satisfactory but may be about right.
44. Elements especially trustworthy.
45. Near the centre. A rather difficult object on many plates. The period given in the table does not satisfy well the measures on the X plates, and has been accepted only for the MW and H plates.
46. A difficult star near the centre. Measured only on the MW plates, with one exception. The elements are doubtless about right.
47. A difficult object near the centre. Measured only on the MW plates, with a few exceptions. The elements are probably about right.
48. Close and difficult star. Measured on only a few of the X and H plates. The elements are probably about right.
49. The mean magnitude of this star is about three quarters of a magnitude brighter than the mean magnitude of all the variables. On account of its distance from desirable comparison stars, unsatisfactory measures were at first obtained and were rejected. As stated on page 199, however, a special sequence of three adjacent stars was selected for this star, and the results obtained by the use of these comparison stars are satisfactory.
50. The period given in the table has not been extended to include the X plates. It satisfies fairly well the observations from J. D. 0724 to 1184, and is probably about right.
51. Rather near the centre and difficult. The elements appear to be fairly satisfactory.
52. Elements especially trustworthy.
53. The elements appear to be about right.
54. A rather difficult star. The elements may be somewhat in doubt.
55. A close and difficult star near the centre. The elements appear to be trustworthy.
56. A rather difficult object near the centre. The elements appear to be trustworthy.
57. A rather difficult star. The elements are probably about right.
58. A difficult object near the centre. The measures are somewhat discordant even on the MW plates. No measures were made on the H plates. The elements given may be about right.
59. Measured only on the MW plates, with one exception. The elements should be regarded as somewhat doubtful.
60. Measured only on the MW plates, with one exception. The elements are probably about right.
61. Measured only on the MW plates, with one exception. The elements should be regarded as somewhat doubtful.
62. Measured only on the MW plates. The elements may be regarded as somewhat doubtful.
63. Measured only on the MW plates. The elements are probably about right.
64. The elements appear to be fairly good.
65. Not measured on the H plates. The elements may be in some doubt.
66. Elements trustworthy.

CHAPTER XII

MISCELLANEOUS RESULTS

THE coordinates of the light curves of the variables, whose periods were given in Table XLV, with the exception of No. 59, will be found in Table XLVI. As in former cases, the period of each variable has been divided into twenty-four equal parts, and the corresponding magnitudes have been read from the smooth curves drawn through all the observations. In most cases, these curves are probably very reliable, but in some cases, less so, owing to the difficulties of measurement. The peculiarities in all cases, may be learned by reference to the Remarks on page 234 following the table of elements. In Table XLVI, the first column on each page gives the number of the points of division. The results for each star are given in three columns, containing the phase, the corresponding magnitude, and the differences obtained by subtracting each magnitude from the one following it.

Mean light curves were derived for the variables in Messier 3 and Messier 5, which may be found in the preceding parts of the present volume. Such mean curves have not been found, however, to differ essentially from those of the individual stars, and they have not been derived for the variables in Messier 15. To illustrate these light curves two examples, Nos. 4 and 14, are given belonging to the group having periods between $0^d.30$ and $0^d.44$, two examples, Nos. 52 and 28, of those having periods between $0^d.57$ and $0^d.76$, and the special star, No. 1, having a period of $1^d.437457$. These are shown in Figs. 1 to 5, in which the black circles

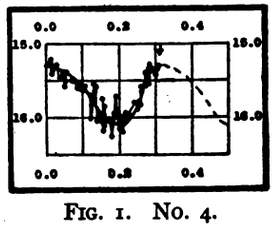


FIG. 1. NO. 4.

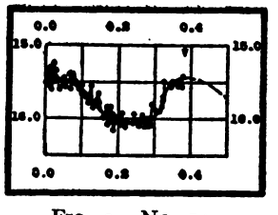


FIG. 2. NO. 14.

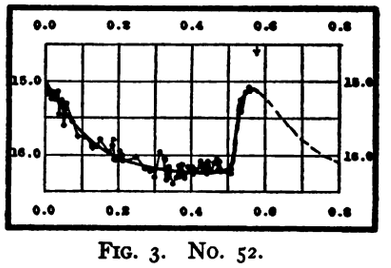


FIG. 3. NO. 52.

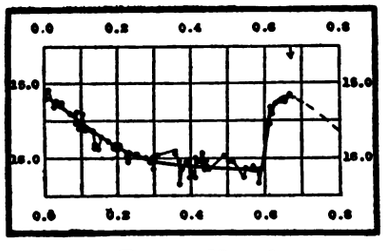


FIG. 4. NO. 28.

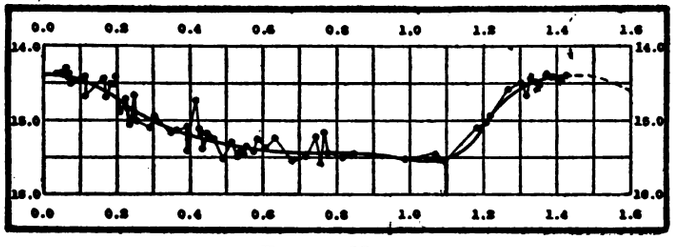


FIG. 5. NO. 1.

TABLE XLVI

LIGHT CURVES

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 1			No. 2			No. 3			No. 4			No. 5		
	d.			*d.*			*d.*			*d.*			*d.*		
0	0.000	14.36	+.05	0.000	15.14	+.10	0.000	15.34	+.03	0.000	15.31	+.02	0.000	15.33	+.01
1	0.060	14.41	+.11	0.028	15.24	+.14	0.016	15.37	+.05	0.013	15.33	+.02	0.016	15.34	+.03
2	0.120	14.52	+.15	0.055	15.38	+.14	0.032	15.42	+.07	0.026	15.35	+.02	0.032	15.37	+.05
3	0.180	14.67	+.16	0.083	15.52	+.15	0.049	15.49	+.07	0.039	15.37	+.03	0.048	15.42	+.05
4	0.240	14.83	+.14	0.111	15.67	+.07	0.065	15.56	+.06	0.052	15.40	+.04	0.064	15.47	+.05
5	0.300	14.97	+.14	0.138	15.74	+.07	0.081	15.62	+.06	0.065	15.44	+.05	0.080	15.52	+.05
6	0.359	15.11	+.11	0.166	15.81	+.06	0.097	15.68	+.07	0.078	15.49	+.06	0.096	15.57	+.05
7	0.419	15.22	+.07	0.194	15.87	+.03	0.114	15.75	+.07	0.091	15.55	+.08	0.112	15.62	+.05
8	0.479	15.29	+.07	0.221	15.90	+.01	0.130	15.82	+.05	0.104	15.63	+.06	0.128	15.67	+.05
9	0.539	15.36	+.05	0.249	15.91	+.01	0.146	15.87	+.05	0.118	15.69	+.09	0.144	15.73	+.06
10	0.599	15.41	+.02	0.276	15.92	+.01	0.162	15.92	+.05	0.131	15.78	+.11	0.160	15.78	+.05
11	0.659	15.43	+.02	0.304	15.93	+.01	0.178	15.97	+.02	0.144	15.89	+.09	0.176	15.83	+.05
12	0.719	15.45	+.03	0.332	15.94	+.01	0.195	15.99	+.01	0.157	15.98	+.05	0.192	15.88	+.04
13	0.779	15.48	+.02	0.359	15.95	.00	0.211	16.00	+.01	0.170	16.03	+.04	0.208	15.92	+.04
14	0.839	15.50	+.02	0.387	15.95	.00	0.227	16.01	+.01	0.183	16.07	+.01	0.224	15.96	+.02
15	0.898	15.52	+.01	0.415	15.95	.00	0.243	16.02	+.01	0.196	16.08	−.02	0.240	15.98	+.01
16	0.958	15.53	−.03	0.442	15.95	.00	0.260	16.03	−.01	0.209	16.06	−.06	0.256	15.99	+.01
17	1.018	15.50	−.14	0.470	15.95	.00	0.276	16.02	−.15	0.222	16.00	−.07	0.272	16.00	−.03
18	1.078	15.36	−.20	0.498	15.95	−.01	0.292	15.87	−.27	0.235	15.93	−.10	0.288	15.97	−.07
19	1.138	15.16	−.24	0.525	15.94	.00	0.308	15.60	−.14	0.248	15.83	−.19	0.304	15.90	−.11
20	1.198	14.92	−.27	0.553	15.94	−.01	0.324	15.46	−.04	0.261	15.64	−.14	0.320	15.79	−.24
21	1.258	14.65	−.17	0.581	15.93	−.43	0.341	15.42	−.04	0.274	15.50	−.13	0.337	15.55	−.13
22	1.318	14.48	−.09	0.608	15.50	−.33	0.357	15.38	−.02	0.287	15.37	−.05	0.353	15.42	−.07
23	1.378	14.39	−.03	0.636	15.17	−.03	0.373	15.36	−0.2	0.300	15.32	−.01	0.369	15.35	−.02
	No. 6			No. 7			No. 8			No. 9			No. 10		
	d.			*d.*			*d.*			*d.*			*d.*		
0	0.000	15.20	+.02	0.000	15.56	+.01	0.000	15.22	+.02	0.000	15.12	+.04	0.000	15.50	+.01
1	0.028	15.22	+.07	0.015	15.57	+.02	0.027	15.24	+.09	0.030	15.16	+.10	0.017	15.51	+.02
2	0.056	15.29	+.11	0.029	15.59	+.04	0.054	15.33	+.10	0.060	15.26	+.11	0.033	15.53	+.05
3	0.083	15.40	+.14	0.044	15.63	+.05	0.081	15.43	+.10	0.089	15.37	+.10	0.050	15.58	+.06
4	0.111	15.54	+.11	0.058	15.68	+.07	0.108	15.53	+.10	0.119	15.47	+.08	0.066	15.64	+.06
5	0.139	15.65	+.10	0.073	15.75	+.07	0.135	15.63	+.08	0.149	15.55	+.09	0.083	15.70	+.04
6	0.166	15.75	+.10	0.087	15.82	+.07	0.162	15.71	+.07	0.179	15.64	+.08	0.100	15.74	+.05
7	0.194	15.85	+.08	0.102	15.89	+.05	0.188	15.78	+.08	0.209	15.72	+.05	0.116	15.79	+.04
8	0.222	15.93	+.06	0.116	15.94	+.06	0.215	15.86	+.07	0.238	15.77	+.06	0.133	15.83	+.04
9	0.250	15.99	+.05	0.131	16.00	+.04	0.242	15.93	+.06	0.268	15.83	+.04	0.149	15.87	+.04

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 6			No. 7			No. 8			No. 9			No. 10		
	d.			d.			d.			d.			d.		
10	0.278	16.04	+.05	0.145	16.04	+.04	0.269	15.99	+.03	0.298	15.87	+.03	0.166	15.91	+.04
11	0.305	16.09	+.03	0.160	16.08	+.04	0.296	16.02	+.02	0.328	15.90	+.02	0.183	15.95	+.03
12	0.333	16.12	+.02	0.174	16.12	+.01	0.323	16.04	+.03	0.358	15.92	+.01	0.199	15.98	+.02
13	0.361	16.14	+.02	0.189	16.13	+.01	0.350	16.07	+.02	0.387	15.93	+.01	0.216	16.00	+.01
14	0.388	16.16	+.04	0.203	16.14	+.01	0.377	16.09	+.01	0.417	15.94	+.01	0.232	16.01	+.01
15	0.416	16.20	+.03	0.218	16.15	+.01	0.404	16.10	+.01	0.447	15.95	+.01	0.249	16.02	+.01
16	0.444	16.23	+.02	0.232	16.16	−.01	0.431	16.11	+.01	0.477	15.96	+.01	0.266	16.03	.00
17	0.472	16.25	+.01	0.247	16.15	−.02	0.458	16.12	+.01	0.507	15.97	+.01	0.282	16.03	−.05
18	0.500	16.26	+.01	0.262	16.13	−.09	0.485	16.13	.00	0.536	15.98	.00	0.299	15.98	−.08
19	0.527	16.27	+.01	0.276	16.04	−.19	0.511	16.13	+.01	0.566	15.98	−.06	0.315	15.90	−.16
20	0.555	16.28	+.01	0.290	15.85	−.15	0.538	16.14	−.05	0.596	15.92	−.19	0.332	15.74	−.09
21	0.583	16.29	−.19	0.305	15.70	−.09	0.565	16.09	−.29	0.626	15.73	−.40	0.348	15.65	−.06
22	0.610	16.10	−.70	0.320	15.61	−.04	0.592	15.80	−.42	0.656	15.33	−.16	0.365	15.59	−.05
23	0.638	15.40	−.20	0.334	15.57	−.01	0.619	15.38	−.16	0.685	15.17	−.05	0.381	15.54	−.04
	No. 11			No. 12			No. 13			No. 14			No. 15		
	d.			d.			d.			d.			d.		
0	0.000	15.28	.00	0.000	15.22	+.02	0.000	15.12	+.05	0.000	15.44	.00	0.000	15.22	+.01
1	0.014	15.28	+.03	0.025	15.24	+.06	0.024	15.17	+.11	0.016	15.44	+.01	0.024	15.23	+.03
2	0.029	15.31	+.04	0.049	15.30	+.09	0.048	15.28	+.12	0.032	15.45	+.01	0.049	15.26	+.05
3	0.043	15.35	+.08	0.074	15.39	+.11	0.072	15.40	+.12	0.048	15.46	+.01	0.073	15.31	+.06
4	0.057	15.43	+.11	0.099	15.50	+.13	0.096	15.52	+.11	0.064	15.47	+.03	0.097	15.37	+.09
5	0.072	15.54	+.09	0.124	15.63	+.10	0.120	15.63	+.11	0.080	15.50	+.04	0.122	15.46	+.08
6	0.086	15.63	+.09	0.148	15.73	+.07	0.144	15.74	+.09	0.095	15.54	+.06	0.146	15.54	+.10
7	0.100	15.72	+.08	0.173	15.80	+.08	0.168	15.83	+.08	0.111	15.60	+.06	0.170	15.64	+.10
8	0.114	15.80	+.05	0.198	15.88	+.08	0.192	15.91	+.07	0.127	15.66	+.09	0.195	15.74	+.12
9	0.129	15.85	+.06	0.222	15.96	+.05	0.216	15.98	+.05	0.143	15.75	+.08	0.219	15.86	+.10
10	0.143	15.91	+.05	0.247	16.01	+.03	0.240	16.03	+.05	0.159	15.83	+.09	0.243	15.96	+.07
11	0.157	15.96	+.05	0.272	16.04	+.04	0.264	16.08	+.01	0.175	15.92	+.06	0.268	16.03	+.05
12	0.172	16.01	+.02	0.296	16.08	+.03	0.288	16.09	+.02	0.191	15.98	+.01	0.292	16.08	+.02
13	0.186	16.03	+.01	0.321	16.11	+.01	0.312	16.11	+.02	0.207	15.99	+.01	0.316	16.10	+.02
14	0.200	16.04	+.01	0.346	16.12	+.01	0.335	16.13	+.02	0.223	16.00	+.01	0.341	16.12	+.01
15	0.214	16.05	+.01	0.370	16.13	.00	0.359	16.15	+.02	0.238	16.01	.00	0.365	16.13	+.01
16	0.229	16.06	+.01	0.395	16.13	−.01	0.383	16.17	+.02	0.254	16.01	−.01	0.389	16.14	+.01
17	0.243	16.07	−.01	0.420	16.12	−.01	0.407	16.19	+.01	0.270	16.00	−.02	0.414	16.15	+.01
18	0.257	16.06	−.02	0.445	16.11	−.01	0.431	16.20	.00	0.286	15.98	−.12	0.438	16.16	−.01
19	0.272	16.04	−.06	0.469	16.10	−.03	0.455	16.20	−.01	0.302	15.86	−.14	0.462	16.15	−.05
20	0.286	15.98	−.18	0.494	16.07	−.27	0.479	16.19	−.04	0.318	15.72	−.14	0.487	16.10	−.37
21	0.300	15.80	−.35	0.519	15.80	−.48	0.503	16.15	−.40	0.334	15.58	−.08	0.511	15.73	−.37
22	0.315	15.45	−.12	0.543	15.32	−.08	0.527	15.75	−.57	0.350	15.50	−.04	0.535	15.36	−.13
23	0.329	15.33	−.05	0.568	15.24	−.02	0.551	15.18	−.06	0.366	15.46	−.02	0.560	15.23	−.01

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 16			No. 17			No. 18			No. 19			No. 20		
	d.			d.			d.			d.			d.		
0	0.000	15.50	+.02	0.000	15.40	+.04	0.000	15.50	+.02	0.000	14.85	+.04	0.000	15.29	+.06
1	0.029	15.52	+.07	0.028	15.44	+.06	0.016	15.52	+.05	0.024	14.89	+.08	0.029	15.35	+.08
2	0.058	15.59	+.06	0.056	15.50	+.07	0.032	15.57	+.06	0.048	14.97	+.16	0.058	15.43	+.08
3	0.087	15.65	+.05	0.084	15.57	+.10	0.047	15.63	+.07	0.072	15.13	+.17	0.088	15.51	+.08
4	0.116	15.70	+.04	0.112	15.67	+.06	0.063	15.70	+.06	0.095	15.30	+.19	0.117	15.59	+.08
5	0.145	15.74	+.03	0.140	15.73	+.05	0.079	15.76	+.06	0.119	15.49	+.13	0.146	15.67	+.06
6	0.174	15.77	+.02	0.167	15.78	+.03	0.095	15.82	+.06	0.143	15.62	+.11	0.175	15.73	+.08
7	0.203	15.79	+.02	0.195	15.81	+.02	0.110	15.88	+.05	0.167	15.73	+.10	0.204	15.81	+.07
8	0.232	15.81	+.02	0.223	15.83	+.02	0.126	15.93	+.03	0.191	15.83	+.10	0.234	15.88	+.06
9	0.260	15.83	+.02	0.251	15.85	+.02	0.142	15.96	+.01	0.215	15.93	+.08	0.263	15.94	+.06
10	0.289	15.85	+.02	0.279	15.87	+.01	0.158	15.97	+.01	0.238	16.01	+.05	0.292	16.00	+.03
11	0.318	15.87	+.02	0.307	15.88	+.01	0.173	15.98	+.01	0.262	16.06	+.02	0.321	16.03	+.04
12	0.347	15.89	+.02	0.335	15.89	+.01	0.189	15.99	+.01	0.286	16.08	+.01	0.350	16.07	+.02
13	0.376	15.91	+.01	0.363	15.90	.00	0.205	16.00	.00	0.310	16.09	+.01	0.379	16.09	+.02
14	0.405	15.92	+.01	0.391	15.90	.00	0.221	16.00	.00	0.334	16.10	.00	0.409	16.11	+.01
15	0.434	15.93	+.01	0.418	15.90	.00	0.236	16.00	.00	0.358	16.10	.00	0.438	16.12	+.01
16	0.463	15.94	+.01	0.446	15.90	.00	0.252	16.00	−.01	0.381	16.10	.00	0.467	16.13	+.02
17	0.492	15.95	+.01	0.474	15.90	.00	0.268	15.99	−.08	0.405	16.10	.00	0.496	16.15	+.01
18	0.521	15.96	+.01	0.502	15.90	−.01	0.284	15.91	−.12	0.429	16.10	.00	0.525	16.16	+.01
19	0.550	15.97	.00	0.530	15.89	−.01	0.299	15.79	−.11	0.453	16.10	−.01	0.555	16.17	−.04
20	0.579	15.97	−.04	0.558	15.88	−.04	0.315	15.68	−.10	0.477	16.09	−.05	0.584	16.13	−.09
21	0.608	15.93	−.18	0.586	15.84	−.24	0.331	15.58	−.06	0.501	16.04	−.44	0.613	16.04	−.44
22	0.637	15.75	−.21	0.614	15.60	−.18	0.347	15.52	−.02	0.524	15.60	−.63	0.642	15.60	−.31
23	0.666	15.54	−.04	0.642	15.42	−.02	0.362	15.50	.00	0.548	14.97	−.12	0.671	15.29	.00
	No. 21			No. 22			No. 23			No. 24			No. 25		
	d.			d.			d.			d.			d.		
0	0.000	15.25	+.06	0.000	15.20	+.04	0.000	15.11	−.04	0.000	15.42	+.02	0.000	15.10	+.09
1	0.026	15.31	+.06	0.030	15.24	+.08	0.026	15.07	+.06	0.015	15.44	+.02	0.028	15.19	+.10
2	0.052	15.37	+.09	0.060	15.32	+.08	0.053	15.13	+.11	0.031	15.46	+.02	0.055	15.29	+.11
3	0.078	15.46	+.10	0.090	15.40	+.07	0.079	15.24	+.12	0.046	15.48	+.03	0.083	15.40	+.11
4	0.104	15.56	+.08	0.120	15.47	+.07	0.105	15.36	+.09	0.062	15.51	+.05	0.110	15.51	+.11
5	0.130	15.64	+.09	0.150	15.54	+.06	0.132	15.45	+.09	0.077	15.56	+.06	0.139	15.62	+.11
6	0.156	15.73	+.09	0.180	15.60	+.05	0.158	15.54	+.07	0.092	15.62	+.06	0.166	15.73	+.08
7	0.182	15.82	+.08	0.210	15.65	+.05	0.185	15.61	+.07	0.108	15.68	+.06	0.194	15.81	+.08
8	0.208	15.90	+.08	0.241	15.70	+.04	0.211	15.68	+.06	0.123	15.74	+.08	0.222	15.89	+.05
9	0.234	15.98	+.06	0.271	15.74	+.04	0.237	15.74	+.06	0.139	15.82	+.10	0.249	15.94	+.04
10	0.260	16.04	+.05	0.301	15.78	+.03	0.264	15.80	+.06	0.154	15.92	+.08	0.277	15.98	+.01
11	0.286	16.09	+.04	0.331	15.81	+.03	0.290	15.86	+.05	0.169	16.00	+.05	0.305	15.99	+.01

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 21			No. 22			No. 23			No. 24			No. 25		
	d.			*d.*			*d.*			*d.*			*d.*		
12	0.312	16.13	+.03	0.361	15.84	+.04	0.316	15.91	+.03	0.185	16.05	+.06	0.333	16.00	.00
13	0.338	16.16	+.03	0.391	15.88	+.04	0.343	15.94	+.01	0.200	16.11	+.06	0.360	16.00	.00
14	0.364	16.19	+.01	0.421	15.92	+.04	0.369	15.95	.00	0.216	16.17	+.01	0.388	16.00	.00
15	0.390	16.20	.00	0.451	15.96	+.02	0.395	15.95	.00	0.231	16.18	−.01	0.416	16.00	.00
16	0.416	16.20	.00	0.481	15.98	+.03	0.422	15.95	.00	0.246	16.17	−.04	0.444	16.00	.00
17	0.443	16.20	−.03	0.511	16.01	+.01	0.448	15.95	.00	0.262	16.13	−.04	0.471	16.00	.00
18	0.469	16.17	−.09	0.541	16.02	+.01	0.474	15.95	.00	0.277	16.09	−.12	0.499	16.00	.00
19	0.495	16.08	−.18	0.571	16.03	+.01	0.501	15.95	−.01	0.293	15.97	−.29	0.527	16.00	.00
20	0.521	15.90	−.40	0.601	16.04	−.11	0.527	15.94	−.01	0.308	15.68	−.15	0.554	16.00	−.15
21	0.547	15.50	−.19	0.631	15.93	−.50	0.554	15.93	−.57	0.323	15.53	−.07	0.582	15.85	−.42
22	0.573	15.31	−.05	0.662	15.43	−.25	0.580	15.36	−.19	0.339	15.46	−.03	0.610	15.43	−.27
23	0.599	15.26	−.01	0.692	15.18	+.02	0.606	15.17	−.06	0.354	15.43	−.01	0.638	15.16	−.06
	No. 26			No. 28			No. 29			No. 30			No. 31		
	d.			*d.*			*d.*			*d.*			*d.*		
0	0.000	14.33	+.01	0.000	15.19	+.05	0.000	15.13	+.05	0.000	15.42	+.01	0.000	15.30	+.03
1	0.017	14.34	+.02	0.028	15.24	+.09	0.024	15.18	+.05	0.017	15.43	+.01	0.018	15.33	+.04
2	0.034	14.36	+.04	0.056	15.33	+.10	0.048	15.23	+.07	0.034	15.44	+.04	0.036	15.37	+.05
3	0.050	14.40	+.05	0.084	15.43	+.10	0.072	15.30	+.10	0.051	15.48	+.06	0.054	15.42	+.06
4	0.067	14.45	+.06	0.112	15.53	+.11	0.096	15.40	+.11	0.068	15.54	+.07	0.073	15.48	+.05
5	0.084	14.51	+.07	0.140	15.64	+.10	0.120	15.51	+.11	0.085	15.61	+.06	0.091	15.53	+.05
6	0.101	14.58	+.06	0.168	15.74	+.09	0.144	15.62	+.10	0.102	15.67	+.05	0.109	15.58	+.05
7	0.117	14.64	+.06	0.196	15.83	+.06	0.167	15.72	+.10	0.118	15.72	+.07	0.127	15.63	+.05
8	0.134	14.70	+.04	0.224	15.89	+.04	0.191	15.82	+.09	0.135	15.79	+.07	0.145	15.68	+.05
9	0.151	14.74	+.06	0.251	15.93	+.04	0.215	15.91	+.05	0.152	15.86	+.05	0.163	15.73	+.06
10	0.168	14.80	+.07	0.279	15.97	+.03	0.239	15.96	+.04	0.169	15.91	+.03	0.182	15.79	+.07
11	0.184	14.87	+.04	0.307	16.00	+.04	0.263	16.00	+.03	0.186	15.94	+.03	0.200	15.86	+.06
12	0.201	14.91	+.03	0.335	16.04	+.03	0.287	16.03	+.01	0.203	15.97	+.02	0.218	15.92	+.07
13	0.218	14.94	+.02	0.363	16.07	+.02	0.311	16.04	+.01	0.220	15.99	+.01	0.236	15.99	+.05
14	0.235	14.96	+.01	0.391	16.09	+.01	0.335	16.05	+.01	0.237	16.00	.00	0.254	16.04	+.03
15	0.251	14.97	.00	0.419	16.10	+.01	0.359	16.06	.00	0.254	16.00	−.01	0.272	16.07	−.01
16	0.268	14.97	−.03	0.447	16.11	+.01	0.383	16.06	.00	0.271	15.99	−.02	0.290	16.06	−.05
17	0.285	14.94	−.07	0.475	16.12	+.01	0.407	16.06	−.01	0.288	15.97	−.12	0.309	16.01	−.10
18	0.302	14.87	−.12	0.503	16.13	+.01	0.431	16.05	−.01	0.305	15.85	−.20	0.327	16.91	−.14
19	0.318	14.75	−.15	0.531	16.14	+.01	0.454	16.04	−.01	0.321	15.65	−.12	0.345	16.77	−.15
20	0.335	14.60	−.14	0.559	16.15	−.01	0.478	16.03	−.20	0.338	15.53	−.08	0.363	16.62	−.17
21	0.352	14.46	−.10	0.587	16.14	−.52	0.502	15.83	−.61	0.355	15.45	−.02	0.381	16.45	−.11
22	0.369	14.36	−.03	0.615	15.62	−.36	0.526	15.22	−.09	0.372	15.43	−.01	0.399	16.34	−.04
23	0.385	14.33	.00	0.643	15.26	−.07	0.550	15.13	.00	0.389	15.42	.00	0.417	16.30	.00

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 32			No. 35			No. 36			No. 38			No. 39		
	d.			*d.*			*d.*			*d.*			*d.*		
0	0.000	15.14	+.06	0.000	15.41	+.02	0.000	15.20	+.09	0.000	15.29	+.02	0.000	15.34	+.02
1	0.025	15.20	+.11	0.016	15.43	+.02	0.026	15.29	+.11	0.016	15.31	+.03	0.016	15.36	+.04
2	0.050	15.31	+.10	0.032	15.45	+.04	0.052	15.40	+.10	0.031	15.34	+.04	0.032	15.40	+.05
3	0.076	15.41	+.10	0.048	15.49	+.05	0.078	15.50	+.10	0.047	15.38	+.07	0.049	15.45	+.06
4	0.101	15.51	+.07	0.064	15.54	+.06	0.104	15.60	+.09	0.062	15.45	+.07	0.065	15.51	+.05
5	0.126	15.58	+.08	0.080	15.60	+.05	0.130	15.69	+.09	0.078	15.52	+.08	0.081	15.56	+.05
6	0.151	15.66	+.08	0.096	15.65	+.06	0.156	15.78	+.10	0.094	15.60	+.08	0.098	15.61	+.05
7	0.177	15.74	+.06	0.112	15.71	+.07	0.182	15.88	+.07	0.109	15.68	+.09	0.114	15.66	+.05
8	0.202	15.80	+.03	0.128	15.78	+.09	0.208	15.95	+.07	0.125	15.77	+.12	0.130	15.71	+.05
9	0.227	15.83	+.02	0.144	15.87	+.06	0.234	16.02	+.06	0.141	15.89	+.08	0.146	15.76	+.07
10	0.252	15.85	+.03	0.160	15.93	+.06	0.260	16.08	+.05	0.156	15.97	+.08	0.162	15.83	+.08
11	0.278	15.88	+.03	0.176	15.99	+.05	0.286	16.13	+.05	0.172	16.05	+.04	0.179	15.91	+.08
12	0.303	15.91	+.02	0.192	16.04	+.03	0.312	16.18	+.02	0.188	16.09	+.03	0.195	15.99	+.06
13	0.328	15.93	+.01	0.208	16.07	+.03	0.338	16.20	+.02	0.203	16.12	+.01	0.211	16.05	+.04
14	0.353	15.94	.00	0.224	16.10	+.01	0.364	16.22	+.01	0.219	16.13	+.02	0.228	16.09	+.04
15	0.378	15.94	+.01	0.240	16.11	−.03	0.390	16.23	+.01	0.235	16.15	+.01	0.244	16.13	+.01
16	0.404	15.95	+.01	0.256	16.08	−.18	0.416	16.24	+.01	0.250	16.16	−.02	0.260	16.14	.00
17	0.429	15.96	+.01	0.272	15.90	−.27	0.442	16.25	.00	0.266	16.14	−.07	0.276	16.14	−.03
18	0.454	15.97	+.01	0.288	15.63	−.11	0.468	16.25	+.01	0.282	16.07	−.24	0.292	16.11	−.14
19	0.479	15.98	.00	0.304	15.52	−.06	0.494	16.26	.00	0.297	15.83	−.19	0.309	15.97	−.22
20	0.505	15.98	−.08	0.320	15.46	−.03	0.520	16.26	−.31	0.313	15.64	−.17	0.325	15.75	−.18
21	0.530	15.90	−.37	0.336	15.43	−.02	0.546	15.95	−.53	0.328	15.47	−.10	0.341	15.57	−.14
22	0.555	15.53	−.34	0.352	15.41	−.01	0.572	15.42	−.22	0.344	15.37	−.06	0.358	15.43	−.07
23	0.580	15.19	−.05	0.368	15.40	+.01	0.598	15.20	.00	0.360	15.31	−.02	0.374	15.36	−.02
	No. 40			No. 42			No. 43			No. 44			No. 45		
	d.			*d.*			*d.*			*d.*			*d.*		
0	0.000	15.34	+.01	0.000	15.34	.00	0.000	15.25	+.01	0.000	15.20	+.09	0.000	15.19	+.06
1	0.016	15.35	+.02	0.015	15.34	+.04	0.017	15.26	+.03	0.025	15.29	+.10	0.028	15.25	+.13
2	0.031	15.37	+.02	0.030	15.38	+.08	0.034	15.29	+.04	0.050	15.39	+.11	0.055	15.38	+.15
3	0.047	15.39	+.03	0.045	15.46	+.10	0.051	15.33	+.04	0.074	15.50	+.09	0.083	15.53	+.14
4	0.063	15.42	+.05	0.060	15.56	+.09	0.068	15.37	+.05	0.099	15.59	+.09	0.110	15.67	+.12
5	0.079	15.47	+.05	0.075	15.65	+.09	0.085	15.42	+.07	0.124	15.68	+.07	0.138	15.79	+.08
6	0.094	15.52	+.06	0.090	15.74	+.06	0.102	15.49	+.09	0.149	15.75	+.09	0.166	15.87	+.06
7	0.110	15.58	+.09	0.105	15.80	+.07	0.119	15.58	+.10	0.174	15.84	+.07	0.193	15.93	+.06
8	0.126	15.67	+.07	0.120	15.87	+.05	0.136	15.68	+.09	0.199	15.91	+.06	0.221	15.99	+.03
9	0.141	15.74	+.07	0.135	15.92	+.04	0.153	15.77	+.04	0.223	15.97	+.03	0.248	16.02	+.04
10	0.157	15.81	+.06	0.150	15.96	+.05	0.170	15.81	+.03	0.248	16.00	+.03	0.276	16.06	+.03
11	0.173	15.87	+.05	0.165	16.01	+.04	0.186	15.84	+.02	0.273	16.03	+.03	0.304	16.09	+.02

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 40			No. 42			No. 43			No. 44			No. 45		
	d.			d.			d.			d.			d.		
12	0.189	15.92	+.03	0.180	16.05	+.02	0.203	15.86	+.01	0.298	16.06	+.01	0.331	16.11	+.01
13	0.204	15.95	+.02	0.195	16.07	.00	0.220	15.87	+.01	0.323	16.07	+.01	0.359	16.12	+.01
14	0.220	15.97	+.01	0.210	16.07	.00	0.237	15.88	.00	0.347	16.08	+.01	0.386	16.13	+.01
15	0.236	15.98	+.01	0.225	16.07	−.01	0.254	15.88	.00	0.372	16.09	+.01	0.414	16.14	.00
16	0.252	15.99	+.01	0.240	16.06	−.03	0.271	15.88	.00	0.397	16.10	+.01	0.442	16.14	.00
17	0.267	16.00	.00	0.255	16.03	−.05	0.288	15.88	−.01	0.422	16.11	.00	0.469	16.14	.00
18	0.283	16.00	−.01	0.270	15.98	−.11	0.305	15.87	−.07	0.447	16.11	.00	0.497	16.14	.00
19	0.299	15.99	−.03	0.285	15.87	−.15	0.322	15.80	−.08	0.472	16.11	.00	0.524	16.14	−.01
20	0.314	15.96	−.08	0.300	15.72	−.15	0.339	15.72	−.18	0.496	16.11	−.03	0.552	16.13	−.02
21	0.330	15.88	−.28	0.315	15.57	−.09	0.356	15.54	−.24	0.521	16.08	−.18	0.580	16.11	−.18
22	0.346	15.60	−.22	0.330	15.48	−.08	0.373	15.30	−.05	0.546	15.90	−.62	0.607	15.93	−.58
23	0.362	15.38	−.04	0.345	15.40	−.06	0.390	15.25	.00	0.571	15.28	−.08	0.635	15.35	−.16
	No. 46			No. 47			No. 48			No. 49			No. 50		
	d.			d.			d.			d.			d.		
0	0.000	15.42	+.08	0.000	15.33	+.04	0.000	15.35	+.03	0.000	14.75	+.01	0.000	15.35	+.01
1	0.029	15.50	+.09	0.028	15.37	+.07	0.016	15.38	+.04	0.017	14.76	+.06	0.012	15.36	+.04
2	0.058	15.59	+.08	0.055	15.44	+.08	0.031	15.42	+.06	0.035	14.82	+.07	0.025	15.40	+.10
3	0.087	15.67	+.07	0.083	15.52	+.07	0.047	15.48	+.09	0.052	14.89	+.09	0.037	15.50	+.10
4	0.115	15.74	+.06	0.110	15.59	+.07	0.063	15.57	+.07	0.070	14.98	+.06	0.050	15.60	+.07
5	0.144	15.80	+.06	0.138	15.66	+.06	0.079	15.64	+.07	0.087	15.04	+.07	0.062	15.67	+.08
6	0.173	15.86	+.07	0.166	15.72	+.05	0.094	15.71	+.07	0.105	15.11	+.08	0.075	15.75	+.06
7	0.202	15.93	+.06	0.193	15.77	+.06	0.110	15.78	+.06	0.122	15.19	+.05	0.087	15.81	+.04
8	0.231	15.99	+.06	0.221	15.83	+.05	0.126	15.84	+.06	0.139	15.24	+.03	0.100	15.85	+.04
9	0.260	16.05	+.06	0.248	15.88	+.05	0.142	15.90	+.05	0.157	15.27	+.02	0.112	15.89	+.04
10	0.289	16.11	+.06	0.276	15.93	+.05	0.157	15.95	+.05	0.174	15.29	+.01	0.124	15.93	+.02
11	0.317	16.17	+.05	0.304	15.98	+.02	0.173	16.00	+.05	0.192	15.30	+.01	0.137	15.95	+.02
12	0.346	16.22	+.05	0.331	16.00	+.01	0.189	16.05	+.05	0.209	15.31	+.01	0.149	15.97	+.01
13	0.375	16.27	+.03	0.359	16.01	+.01	0.205	16.10	+.04	0.226	15.32	+.01	0.162	15.98	+.01
14	0.404	16.30	+.02	0.386	16.02	+.01	0.220	16.14	+.03	0.244	15.33	+.01	0.174	15.99	+.01
15	0.433	16.32	.00	0.414	16.03	.00	0.236	16.17	.00	0.261	15.34	+.01	0.187	16.00	.00
16	0.462	16.32	.00	0.442	16.03	+.01	0.252	16.17	−.04	0.279	15.35	.00	0.199	16.00	.00
17	0.491	16.32	−.01	0.469	16.04	.00	0.268	16.13	−.11	0.296	15.35	.00	0.211	16.00	−.03
18	0.519	16.31	.00	0.497	16.04	−.01	0.283	16.02	−.12	0.314	15.35	.00	0.224	15.97	−.09
19	0.548	16.31	−.02	0.524	16.03	−.13	0.299	15.90	−.14	0.331	15.35	−.01	0.236	15.88	−.10
20	0.577	16.29	−.34	0.552	15.90	−.33	0.315	15.76	−.10	0.348	15.34	−.03	0.249	15.78	−.18
21	0.606	15.95	−.40	0.580	15.57	−.23	0.331	15.66	−.10	0.366	15.31	−.11	0.261	15.60	−.15
22	0.635	15.55	−.13	0.607	15.34	−.02	0.346	15.56	−.11	0.383	15.20	−.40	0.274	15.45	−.08
23	0.664	15.42	.00	0.635	15.32	+.01	0.362	15.45	−.10	0.401	14.80	−.05	0.286	15.37	−.02

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 51			No. 52			No. 53			No. 54			No. 55		
	d.			*d.*			*d.*			*d.*			*d.*		
0	0.000	15.51	+.03	0.000	15.12	+.08	0.000	15.28	+.01	0.000	15.58	+.01	0.000	15.49	+.04
1	0.017	15.54	+.04	0.024	15.20	+.12	0.017	15.29	+.03	0.017	15.59	+.01	0.030	15.53	+.07
2	0.033	15.58	+.05	0.048	15.32	+.17	0.035	15.32	+.03	0.033	15.60	+.02	0.060	15.60	+.07
3	0.050	15.63	+.05	0.072	15.49	+.15	0.052	15.35	+.05	0.050	15.62	+.02	0.090	15.67	+.07
4	0.066	15.68	+.05	0.096	15.64	+.12	0.069	15.40	+.07	0.066	15.64	+.04	0.120	15.74	+.07
5	0.083	15.73	+.05	0.120	15.76	+.08	0.086	15.47	+.10	0.083	15.68	+.04	0.150	15.81	+.08
6	0.099	15.78	+.04	0.144	15.84	+.08	0.104	15.57	+.08	0.100	15.72	+.05	0.180	15.89	+.08
7	0.116	15.82	+.05	0.168	15.92	+.07	0.121	15.65	+.06	0.116	15.77	+.05	0.210	15.97	+.06
8	0.133	15.87	+.03	0.192	15.99	+.05	0.138	15.71	+.05	0.133	15.82	+.06	0.240	16.03	+.05
9	0.149	15.90	+.03	0.216	16.04	+.04	0.155	15.76	+.05	0.149	15.88	+.07	0.270	16.08	+.05
10	0.166	15.93	+.04	0.240	16.08	+.04	0.173	15.81	+.03	0.166	15.95	+.06	0.300	16.13	+.04
11	0.182	15.97	+.03	0.264	16.12	+.03	0.190	15.84	+.03	0.183	16.01	+.04	0.330	16.17	+.04
12	0.199	16.00	+.02	0.288	16.15	+.03	0.207	15.87	+.02	0.199	16.05	+.05	0.360	16.21	+.03
13	0.215	16.02	+.01	0.312	16.18	+.01	0.224	15.89	+.01	0.216	16.10	+.01	0.390	16.24	+.03
14	0.232	16.03	.00	0.336	16.19	+.01	0.242	15.90	+.01	0.232	16.11	+.01	0.420	16.27	+.01
15	0.249	16.03	.00	0.360	16.20	+.01	0.259	15.91	.00	0.249	16.12	+.01	0.450	16.28	+.01
16	0.265	16.03	−.04	0.384	16.21	+.01	0.276	15.91	−.02	0.266	16.13	−.01	0.480	16.29	+.01
17	0.282	15.99	−.09	0.408	16.22	+.01	0.293	15.89	−.04	0.282	16.12	−.03	0.510	16.30	.00
18	0.298	15.90	−.17	0.432	16.23	+.01	0.311	15.85	−.09	0.299	16.09	−.10	0.540	16.30	.00
19	0.315	15.73	−.12	0.456	16.24	.00	0.328	15.76	−.13	0.315	15.99	−.19	0.570	16.30	−.01
20	0.331	15.61	−.05	0.480	16.24	.00	0.345	15.63	−.16	0.332	15.80	−.11	0.600	16.29	−.04
21	0.348	15.56	−.03	0.504	16.24	−.54	0.362	15.47	−.11	0.349	15.69	−.06	0.630	16.25	−.30
22	0.365	15.53	−.02	0.528	15.70	−.57	0.380	15.36	−.07	0.365	15.63	−.03	0.660	15.95	−.45
23	0.381	15.51	.00	0.552	15.13	−.01	0.397	15.29	−.01	0.382	15.60	−.02	0.690	15.50	−.01
	No. 56			No. 57			No. 58			No. 60			No. 61		
	d.			*d.*			*d.*			*d.*			*d.*		
0	0.000	15.19	+.04	0.000	15.26	+.06	0.000	15.64	+.04	0.000	15.29	+.01	0.000	15.43	+.03
1	0.024	15.23	+.05	0.015	15.32	+.06	0.018	15.68	+.04	0.029	15.30	+.04	0.025	15.46	+.07
2	0.048	15.28	+.11	0.029	16.38	+.06	0.035	15.72	+.05	0.058	15.34	+.06	0.051	15.53	+.09
3	0.071	15.39	+.13	0.044	16.44	+.07	0.053	15.77	+.05	0.086	15.40	+.07	0.076	15.62	+.09
4	0.095	15.52	+.15	0.058	16.51	+.07	0.070	15.82	+.05	0.115	15.47	+.07	0.102	15.71	+.09
5	0.119	15.67	+.13	0.073	16.58	+.06	0.088	15.87	+.06	0.144	15.54	+.09	0.127	15.80	+.09
6	0.143	15.80	+.11	0.087	16.64	+.07	0.105	15.93	+.07	0.173	15.63	+.10	0.153	15.89	+.08
7	0.166	15.91	+.06	0.102	16.71	+.06	0.123	16.00	+.07	0.202	15.73	+.09	0.178	15.97	+.06
8	0.190	15.97	+.05	0.116	16.77	+.05	0.140	16.07	+.06	0.231	15.82	+.06	0.203	16.03	+.06
9	0.214	16.02	+.03	0.131	16.82	+.04	0.158	16.13	+.05	0.259	15.88	+.03	0.229	16.09	+.02
10	0.238	16.05	+.01	0.145	16.86	+.04	0.175	16.18	+.03	0.288	15.91	+.03	0.254	16.11	+.02
11	0.261	16.06	+.01	0.160	16.90	+.03	0.193	16.21	+.03	0.317	15.94	+.03	0.280	16.13	+.01

Part	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ	Phase	Magn.	Δ
	No. 56			No. 57			No. 58			No. 60			No. 61		
	d.			d.			d.			d.			d.		
12	0.285	16.07	+.01	0.174	16.93	+.01	0.210	16.24	+.03	0.346	15.97	+.02	0.305	16.14	+.01
13	0.309	16.08	+.01	0.189	16.94	+.02	0.228	16.27	+.02	0.375	15.99	+.01	0.331	16.15	+.01
14	0.333	16.09	+.01	0.204	16.96	−.02	0.245	16.29	+.02	0.404	16.00	.00	0.356	16.16	.00
15	0.356	16.10	+.01	0.218	16.94	−.08	0.263	16.31	+.01	0.432	16.00	.00	0.381	16.16	.00
16	0.380	16.11	.00	0.233	16.86	−.10	0.280	16.32	.00	0.461	16.00	.00	0.407	16.16	.00
17	0.404	16.11	.00	0.247	16.76	−.13	0.298	16.32	−.08	0.490	16.00	.00	0.432	16.16	.00
18	0.428	16.11	−.01	0.262	16.63	−.09	0.315	16.24	−.11	0.519	16.00	.00	0.458	16.16	.00
19	0.451	16.10	−.02	0.276	16.54	−.09	0.333	16.13	−.16	0.548	16.00	−.01	0.483	16.16	−.08
20	0.475	16.08	−.20	0.291	16.45	−.07	0.350	15.97	−.19	0.577	15.99	−.25	0.509	16.08	−.43
21	0.499	16.88	−.45	0.305	16.38	−.05	0.368	15.78	−.12	0.605	15.74	−.36	0.534	15.65	−.15
22	0.523	16.43	−.20	0.320	16.33	−.04	0.385	15.66	−.02	0.634	15.38	−.08	0.559	15.50	−.06
23	0.546	16.23	−.04	0.334	16.29	−.03	0.403	15.64	.00	0.663	15.30	−.01	0.585	15.44	−.01
	No. 62			No. 63			No. 64			No. 65			No. 66		
	d.			d.			d.			d.			d.		
0	0.000	15.66	+.02	0.000	15.54	+.02	0.000	15.61	+.02	0.000	15.43	+.07	0.000	15.41	+.01
1	0.016	15.68	+.04	0.028	15.56	+.05	0.015	15.63	+.03	0.032	15.50	+.07	0.016	15.42	+.03
2	0.032	15.72	+.04	0.056	15.61	+.05	0.029	15.66	+.04	0.063	15.57	+.07	0.032	15.45	+.05
3	0.049	15.76	+.05	0.084	15.66	+.07	0.044	15.70	+.04	0.094	15.64	+.07	0.047	15.50	+.05
4	0.065	15.81	+.07	0.112	15.73	+.10	0.059	15.74	+.05	0.126	15.71	+.07	0.063	15.55	+.05
5	0.081	15.88	+.06	0.140	15.83	+.10	0.073	15.79	+.05	0.158	15.78	+.06	0.079	15.60	+.06
6	0.097	15.94	+.09	0.168	15.93	+.08	0.088	15.84	+.05	0.189	15.84	+.06	0.095	15.66	+.09
7	0.113	16.03	+.08	0.196	16.01	+.08	0.103	15.89	+.05	0.220	15.90	+.05	0.111	15.75	+.08
8	0.129	16.11	+.05	0.225	16.09	+.06	0.117	15.94	+.06	0.252	15.95	+.04	0.127	15.83	+.09
9	0.146	16.16	+.05	0.253	16.15	+.06	0.132	16.00	+.05	0.284	15.99	+.05	0.142	15.92	+.07
10	0.162	16.21	+.02	0.281	16.21	+.06	0.146	16.05	+.05	0.315	16.04	+.04	0.158	15.99	+.07
11	0.178	16.23	+.02	0.309	16.27	+.04	0.161	16.10	+.04	0.346	16.08	+.04	0.174	16.06	+.03
12	0.194	16.25	+.01	0.337	16.31	+.03	0.176	16.14	+.05	0.378	16.12	+.03	0.190	16.09	+.01
13	0.210	16.26	.00	0.365	16.34	+.04	0.190	16.19	+.03	0.410	16.15	+.01	0.206	16.10	.00
14	0.226	16.26	−.01	0.393	16.38	+.03	0.205	16.22	+.01	0.441	16.16	+.01	0.221	16.10	−.02
15	0.243	16.25	−.01	0.421	16.41	+.02	0.220	16.23	+.01	0.472	16.17	+.01	0.237	16.08	−.02
16	0.259	16.24	−.04	0.449	16.43	+.01	0.234	16.24	−.01	0.504	16.18	.00	0.253	16.06	−.06
17	0.275	16.20	−.13	0.477	16.44	.00	0.249	16.23	−.08	0.536	16.18	.00	0.269	16.00	−.08
18	0.291	16.07	−.25	0.505	16.44	−.01	0.264	16.15	−.10	0.567	16.18	−.01	0.285	15.92	−.13
19	0.307	15.82	−.12	0.533	16.43	−.11	0.278	16.05	−.17	0.598	16.17	−.09	0.301	15.79	−.12
20	0.323	15.70	−.05	0.561	16.32	−.22	0.293	15.88	−.14	0.630	16.08	−.35	0.316	15.67	−.13
21	0.340	15.65	.00	0.589	16.10	−.32	0.308	15.74	−.07	0.662	16.73	−.21	0.332	15.54	−.07
22	0.356	15.65	.00	0.618	15.78	−.18	0.322	15.67	−.05	0.693	16.52	−.08	0.348	15.47	−.05
23	0.372	15.65	+.01	0.646	15.60	−.06	0.337	15.62	−.01	0.724	16.44	−.01	0.364	15.42	−.01

represent the mean magnitudes from the measures of L and W on the individual plates. For these illustrations, especially favorable stars were chosen, in order that the true light curves might be clearly indicated. They probably represent well the different varieties of variables found in this cluster. It was shown in Part 2 of this volume that the light curves of the eight stars of very short periods, or of double maxima, might be obtained by the union of two variables of the ordinary cluster type. In Messier 5 the mean period of one group was about one half that of the other group. In Messier 15, while the mean period of the group having short periods is more than half that of the second group, various stars of the first group may be compared with individual variables of the second group having double the period. The line of argument, therefore, used in Part 2, to account for the variables of very short period, is not inapplicable to the corresponding stars in Messier 15. Also, it may not be without significance that the period of Variable No. 1 is about double that of some of the variables in the second group.

The number of variables of periods of different lengths is shown graphically in Fig. 6. Of the 61 stars whose periods have been determined, 1 has a period of $0^d.30$,

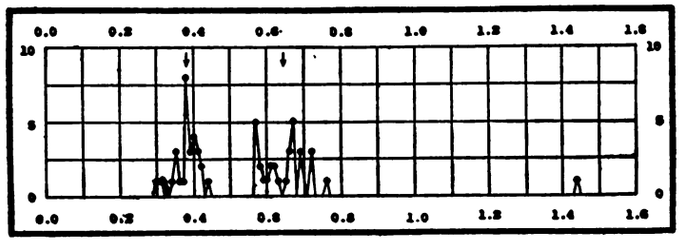


FIG. 6.

expressed to the nearest hundredth of a day, 1 of $0^d.31$, 0 of $0^d.32$ and $0^d.33$, 1 of $0^d.34$, 3 of $0^d.35$, 1 of $0^d.36$ and $0^d.37$, 8 of $0^d.38$, 3 of $0^d.39$, 4 of $0^d.40$, 3 of $0^d.41$, 2 of $0^d.42$, 0 of $0^d.43$, and 1 of $0^d.44$. No star was found having a period between $0^d.45$ and $0^d.56$. The two groups are thus distinctly separated. The second group begins abruptly with 5 stars of $0^d.57$. There are 2 of $0^d.58$, 1 of $0^d.59$ and $0^d.60$, 2 of $0^d.61$ and $0^d.62$, 1 of $0^d.63$, 0 of $0^d.64$, 1 of $0^d.65$, 3 of $0^d.66$, 5 of $0^d.67$, 0 of $0^d.68$, 3 of $0^d.69$, 1 of $0^d.70$, 0 of $0^d.71$, 3 of $0^d.72$, 0 of $0^d.73$, $0^d.74$, and $0^d.75$, and 1 of $0^d.76$. No. 1 has a period of $1^d.44$.

The relation of the length of the period to the other elements is shown in Table XLVII. For this purpose, the 61 variables, whose periods have been determined, were arranged in twelve groups, each of 5 stars, omitting No. 1. For the comparison of magnitudes, No. 49 has also been omitted, as it is exceptionally bright. Successive columns in the table give the number of the group, the mean period

TABLE XLVII

RELATION OF PERIOD TO OTHER ELEMENTS

No. Group	Mean Period	Mean Distance	Mean Maximum	Mean Minimum	Mean of Max. and Min.	Range	Increase	Decrease
	d.	′						
1	0.331	2.4	15.35	16.06	15.71	0.70	0.6	0.26
2	0.367	2.3	15.40	16.13	15.76	0.73	0.6	0.22
3	0.380	2.9	15.42	16.08	15.75	0.66	0.4	0.20
4	0.390	2.6	15.43	16.09	15.76	0.66	0.6	0.16
5	0.402	3.8	15.42	16.00	15.71	0.59	0.5	0.16
6	0.451	2.3	15.43	16.10	15.76	0.66	0.6	0.16
7	0.573	2.9	15.08	16.14	15.61	1.06	1.2	0.26
8	0.598	2.6	15.24	16.11	15.68	0.87	1.2	0.16
9	0.638	2.2	15.18	16.14	15.66	0.96	1.1	0.18
10	0.665	2.5	15.23	16.04	15.63	0.80	0.8	0.16
11	0.685	3.1	15.38	16.18	15.78	0.79	0.6	0.12
12	0.723	2.4	15.30	16.13	15.72	0.84	0.8	0.10
Means	0.517	2.7	15.32	16.10	15.71	0.78	0.8	0.18

expressed to thousandths of a day of the five stars composing it, the mean distance from the centre of the cluster, expressed in minutes of arc, the mean maximum magnitude, the mean minimum magnitude, the mean of the maximum and minimum magnitudes, the mean range, the mean maximum rate of increase in light, and the mean maximum rate of decrease in light. These quantities are all derived from Table XLV. The results are shown graphically in Fig. 7. From an inspection of the table and diagram, it appears that the length of the period has little, if any, relation to the distance from the centre. The mean magnitude, also, is remarkably uniform for all the groups, but there is a fairly well marked increase in the maximum brightness of stars having periods greater than half a day. A still further increase in the period, however, appears to be accompanied by a decrease in magnitude. This is apparently due in large part to changes in the maximum magnitude, as the minimum magnitude shows a fairly uniform,

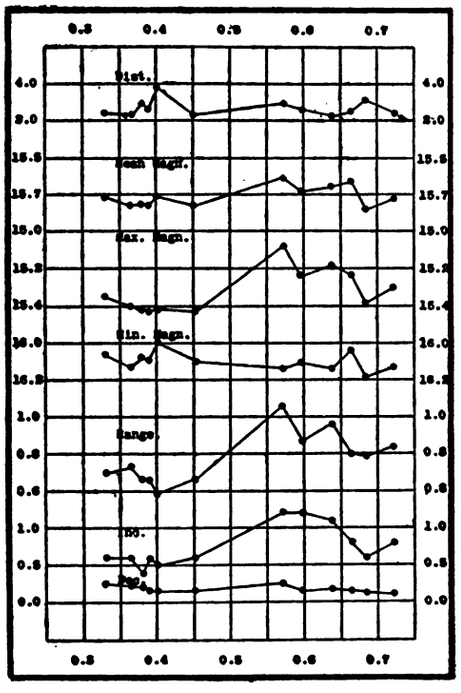


FIG. 7.

though slight, decrease as the length of period increases. The combination of the two is better shown in the range. The curve showing the maximum rate of increase in light follows closely in general form the curves of the maximum magnitude and range, while the rate of decrease shows little, if any, variation. With the exception of Nos. 1 and 49, the uniformity of the mean magnitudes is remarkable. The mean magnitude of the remaining 59 variables is 15.71. The largest deviation of an individual star from this mean is that of No. 63, which is +0.28 magn., the largest negative residual being −0.23 magn. The extreme difference between the brightest and faintest variable is thus 0.51 magn. The average deviation from the mean is ±0.08 magn. Even this small range in magnitude appears to vary systematically with the distance from the centre of the cluster. Of the eight stars whose magnitudes give residuals of +0.10, or greater, none is distant more than 1′.5 from the centre, the mean distance being 1′.1. Of the ten stars, whose residuals are −0.10, or more, none is nearer than 2′.0, the mean distance being 4′.0. Arranging these 59 variables in 12 groups of 5 variables each, according to distance from the centre, we obtain the results given in Table XLVIII. The last

TABLE XLVIII

RELATION BETWEEN MAGNITUDE AND DISTANCE

Group	Mean Distance	Maximum Magnitude	Minimum Magnitude	Mean Magnitude	Group	Mean Distance	Maximum Magnitude	Minimum Magnitude	Mean Magnitude
	′					′			
1	0.9	15.52	16.23	15.87	7	2.4	15.26	16.04	15.65
2	1.1	15.38	16.22	15.80	8	2.8	15.31	16.07	15.69
3	1.3	15.35	16.17	15.76	9	3.1	15.19	16.08	15.64
4	1.5	15.35	16.14	15.75	10	3.9	15.32	16.05	15.68
5	1.9	15.35	16.06	15.71	11	4.9	15.19	16.03	15.61
6	2.2	15.37	16.06	15.72	12	7.2	15.24	16.01	15.62

group is the mean of 4 stars. The first column gives the number of the group, No. 1 containing the 5 variables nearest the centre. The second column gives the corresponding mean distance, and the third, fourth, and fifth columns, the maximum, the minimum, and the mean magnitudes. A graphical representation of these results is shown in Fig. 8. The extreme range indicated by the table and diagram is from two to three tenths of a magnitude.

The necessity for a correction to photographic magnitudes, dependent on distance from the centre of the plate, is well known. Since the centre of the cluster is in general near the centre of the plate, the suspicion naturally arises that the change of magnitude shown in Table XLVIII might be due to this cause. The curves given

in Fig. 8, however, are distinctly different in form from those derived by Miss Leavitt, Professor Seares, and other investigators for the correction depending on distance from the centre. See H.A. 71, 124, and Plate 3, Figs. 2 and 3; also Contributions from the Mount Wilson Solar Observatory, No. 80. The change in brightness in Messier 15 appears to be rapid near the centre, while at greater distances the magnitude becomes nearly or quite uniform.

Shapley has encountered uncertainties in the magnitudes of stars near the centres of globular clusters. He attributes this, in part at least, to the fact pointed out by Eberhard, that the intensity of photographic images is affected by the density of the adjacent parts of the plate. See Physikalische Zeitschrift, 13, 288, 1912. In the Hercules Cluster, Messier 13, Shapley found an apparent increase in the value of the color index near the centre, the mean value for stars at greater distance than 2′ being +0.55, and of those toward the centre, +1.3. This he ascribes to the Eberhard effect. In spite of this, and various other uncertainties, he concludes "that the brighter stars are slightly more concentrated toward the centre than the fainter ones." See Contributions from the Mount Wilson Solar Observatory, No. 116. The opposite condition appears to be true for the variables in Messier 15. If the central stars were in reality redder than those at greater distances, this fact would be apparent from the relative faintness of their photographic magnitudes, more or less as they are found to be in Table XLVIII. Advance sheets, however, of an article by Shapley give the color indices for 39 of the variables in Messier 15, an examination of which shows small, if any, increase in color toward the centre. The problem is further complicated by the study of other clusters. A similar grouping of the variables according to distance from the centre has been made for the clusters ω Centauri, Messier 3, and Messier 5. In Messier 5 no change in magnitude dependent on distance is apparent, while in ω Centauri and Messier 3 a decrease in brightness with increasing distance is indicated. It may be that in Messier 15 the fainter variables are really nearer the centre, while in other clusters a different arrangement prevails.

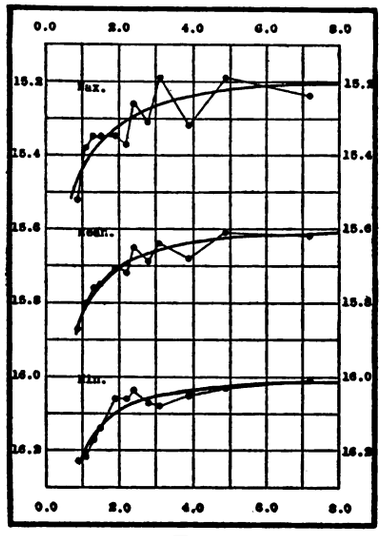


FIG. 8

In H. C. 173, Miss Leavitt announced the important discovery that for the 25 variables in the Small Magellanic Cloud, whose periods had at that time been found, a definite relation existed between the magnitudes and the length of the periods.

The law is expressed by the statement that the logarithm of the period increases by about 0.48 for each increase of one magnitude in brightness. The range in length of period in the stars under discussion was from $1^d.25$ to $127^d.0$, the corresponding mean magnitudes being 15.45 and 11.65. No such range in periods or magnitudes is found among the ordinary cluster variables. Nevertheless, it may be worth while to test the universality of this law by such data as exist in the globular clusters. The variables in ω Centauri were divided into three subclasses, a, b, and c, whose mean periods are, respectively, $0^d.59$, $0^d.75$, and $0^d.39$. The corresponding mean magnitudes are 13.55, 13.54, and 13.61. H. A 38, 208. In Messier 3, the 110 variables whose periods were determined appear to belong to the same subclass, the periods ranging between $0^d.4$ and $0^d.7$. When grouped according to length of period these variables show a decrease in maximum magnitude with increase in the length of period. See page 87. Also Fig. 4, Plate 2. In Messier 5, eight stars were found whose periods, when derived from successive maxima, were about one-half as long as those of the remaining variables. The mean period in one case was $0^d.271$, and in the other, $0^d.547$. The corresponding mean magnitudes are 14.98 and 14.95. In Messier 15, omitting Vars. 1 and 49, 28 variables have periods between $0^d.30$ and $0^d.44$, and 31 variables between $0^d.57$ and $0^d.76$, the mean periods of the two groups being $0^d.379$ and $0^d.644$. The corresponding mean magnitudes are 15.74 and 15.66. Var. No. 1 is considered below. No. 49 is nearly three-quarters of a magnitude brighter than the mean magnitude of the other variables, while its period is much less than the mean. Such a case might occur from the presence of a fairly bright companion too close to be separated from the variable. From the above statements it is evident that Miss Leavitt's law is not applicable to the small differences in the length of period which occur in the different groups of cluster variables. The differences in brightness, which according to the law would in many cases amount to half a magnitude, or more, do not exist. On the contrary, the uniformity of the mean magnitudes of all the ordinary variables in a given cluster is a striking feature. There are, however, a few exceptional variables in the above clusters, whose periods are much longer than those of the others. The light curves of some of these are similar in form to those of the ordinary cluster variables, so that they may be unusual examples of the Cepheid type. Such stars have been brought together in the following table. In each case they have been compared with the mean magnitude and period of the great mass of variables in the same cluster. The first column in Table XLIX gives the name of the cluster, and the second and third columns, the mean magnitude and period of the variables in the cluster. The fourth column contains the number of the variable under consideration, and the fifth and sixth columns, the correspond-

ing magnitude and period, expressed in hours. The seventh column gives the period which would result by the application of Miss Leavitt's law, and the eighth, the difference, observed minus computed. The ninth and tenth columns give the corresponding logarithms. The law would be satisfied by a different magnitude as well as by a change in the period, and the eleventh column gives the difference between the observed magnitude and that required to satisfy the law in connection with the

TABLE XLIX

RELATION BETWEEN MAGNITUDE AND PERIOD

Cluster	Mean Magn. All	Mean Period All	Variable	Magn. Variable	O	C	O-C	Log. Obs'd Per.	Log. Comp'd Per. Law	Magn. Corr.
		h.			h.	h.	h.			
ω Cent.	13.57	13.2	No. 1	10.95	704.	239.	+ 465.	2.848	2.378	−0.98
"	"	"	" 29	11.94	354.	80.	+ 274.	2.549	1.903	−1.35
"	"	"	" 60	12.74	32.5	33.0	− 0.5	1.512	1.519	+0.01
Messier 5	14.96	13.1	" 42	11.72	618.	470.	+ 148.	2.791	2.672	−0.25
"	"	"	" 50	13.60	2544.	59.	+2485.	3.406	1.770	−3.41
"	"	"	" 84	12.08	636.	316.	+ 320.	2.803	2.500	−0.63
Messier 15	15.71	12.4	" 1	14.95	34.5	28.7	+ 5.8	1.538	1.458	−0.17

observed period. An examination of the table shows in general a tendency to follow the law, but in most cases with large deviations. No. 60, in ω Centauri, No. 42, in Messier 5, and No. 1, in Messier 15, follow it closely. No. 50, in Messier 5, is the most discordant. With one exception, the real period is longer, or the magnitude fainter, than the law would indicate. A moderate increase of the magnitude of No. 84, in Messier 5, would render it accordant. Owing to doubt as to the real nature of these special variables, and to other uncertainties, more definite conclusions from these data cannot be safely made at the present time.

DESCRIPTION OF PLATE 1.

The Cluster Messier 15. This chart is reproduced from a plate, 3432, made on Mount Wilson, September 6, 1916, with the 60-inch Reflector, and loaned by Dr. Shapley. The exposure was 9^m. The scale is $5'' = 0.1$ cm. All the variables and comparison stars are shown with the exception of b_4, which is too distant.

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